

FROM THE CHIEF HISTORIAN



This is my last newsletter as the National Aeronautics and Space Administration (NASA) Chief Historian. Having reached the canonical 30 years of federal government service, I will be retiring shortly after the Apollo 11 40th anniversary, returning to full time research and writing. It has been an honor to serve, especially during the 50th anniversary celebrations, as historian for the world's premier agency for exploration.

A look back at our newsletters after my arrival almost six years ago indicates that we have achieved many of the goals we set for ourselves at that time. I am particularly proud of the four conferences we have sponsored and their proceedings: *Critical Issues in the History of Spaceflight*, *Societal Impact of Spaceflight*, *Remembering the Space Age*, and *NASA's First 50 Years*. I believe these will stand the test of time, as well as the *Risk and Exploration* volume we published as part of the memorable Administrator's Symposium on that subject in Monterey, California, in 2004. All of these volumes can be found online at <http://www.history.nasa.gov/series95.html>.

At the same time, we have moved ahead on numerous book projects, including our flagship series: volumes 6 and 7 of John Logsdon's *Exploring the Unknown* (with one more to come), the first 3 of the 4 volumes of Boris Chertok's memoirs *Rockets and People* (edited by Asif Siddiqi), and volumes 2 and 3 of Jim Hansen's *The Wind and Beyond*. We have updated our standard series of reference works, including the Historical Data

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BORIS CHERTOK'S *ROCKETS AND PEOPLE*

By Asif A. Siddiqi, visiting scholar, Space, Policy, and Society Research Group, Massachusetts Institute of Technology

For those interested in the history of Russian space exploration, and more broadly in the history of space exploration during the Cold War, the memoirs of Boris Chertok provide a striking and unique perspective. Chertok is one of those rare actors in history who not only played a critical role in the program but has been able to convey with grace and eloquence his experiences to the broader public. For over 40 years, Chertok worked at the senior-most levels of the famous "OKB-1" design bureau, which in its present incarnation as the Energiya Rocket-Space Corporation continues to play a leading role in the Russian human spaceflight program.

Chertok began his career as an electrician in 1930 at an aviation factory near Moscow. Thirty years later, he was one of the senior designers in charge of the Soviet Union's crowning achievement as a space power: the launch of Yuriy Gagarin, the world's first space voyager. The experiences

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Boris Chertok's Rockets and People (continued)

of Chertok's 60-year-long career, punctuated by the extraordinary accomplishments of both Sputnik and Gagarin and then continuing to the many successes and failures of the Soviet space program, constitute the core of his memoirs, *Rockets and People*. In these four volumes, Academician Chertok not only describes and remembers, but also elicits and extracts profound insights from an epic story about a society's quest to explore the cosmos.

Chertok began writing his memoirs in the early 1990s, around the time of the collapse of the Soviet Union, when it was finally possible to speak frankly and without fear about Soviet history. Originally, he had only intended to write about his experiences from the postwar years in one volume, at the most two. Readers responded so positively to the first volume, *Rakety i lyudi (Rockets and People)*, published in 1994, that Chertok continued to write, eventually producing three more substantial volumes, published in 1996, 1997, and 1999, covering the entire history of the Soviet missile and space programs.¹

My initial interest in the memoirs was purely historical: I was fascinated by the wealth of technical arcana in the books, specifically projects and concepts that had remained hidden throughout much of the Cold War. Those interested in dates, statistics, and the “nuts and bolts” of history found much that was useful in these pages. As I continued to read, however, I became engrossed by the overall rhythm of Academician Chertok's narrative, which gave voice and humanity to a story ostensibly about mathematics and technology. In his writings, I found a richness that had been nearly absent in most of the disembodied, clinical, and often speculative writing by westerners studying the Soviet space program. Because of Chertok's storytelling skills, his memoir was a much-needed corrective to the outdated western view of Soviet space achievements as a mishmash of propaganda, self-delusion, and Cold War rhetoric. In Chertok's story, we meet real people with real dreams who achieved extraordinary successes under very difficult conditions.

Because of the importance of Academician Chertok's memoirs, I did not hesitate when the then-acting Chief of the NASA History Division, Stephen Garber, invited me to serve as project editor for the English-language version. Jesco von Puttkamer at NASA Headquarters (HQ) served as the guiding spirit behind the entire project. He was instrumental in setting up the arrangements for cooperation between the two parties; without his passion and enthusiasm for bringing Chertok's writings to a broader audience, this endeavor might not have gone beyond conception. Once the project was initiated, I was excited to learn that Academician Chertok would be providing entirely *new* chapters for most of the four volumes, updated and corrected from the original Russian-language editions. In that sense, these English-language versions are the most updated and final versions of Chertok's memoirs.

Early this coming summer, the NASA History Division is about to issue the third volume of the four-volume set. If the first volume covered his apprenticeship as an engineer and the second, the birth of the Soviet postwar missile program, in the third volume, we finally have what might be called the full bloom of the Soviet space program. Here, Chertok describes his impressions of the apex of Soviet achievements in

1. *Rakety i lyudi [Rockets and People]* (Moscow: Mashinostroyeniye, 1994); *Rakety i lyudi: Fili Podlipki Tyuratam [Rockets and People: Creating a Rocket Industry]* (Moscow: Mashinostroyeniye, 1996); *Rakety i lyudi: goryachiye dni kholodnoy voyny [Rockets and People: Hot Days of the Cold War]* (Moscow: Mashinostroyeniye, 1997); *Rakety i lyudi: lunnaya gonka [Rockets and People: The Moon Race]* (Moscow: Mashinostroyeniye, 1999).

space exploration, from the halcyon days of the launch of Yuriy Gagarin into orbit in 1961 to the first piloted Soyuz mission in 1967.

Chertok devotes a significant portion of the volume to the early years of Soviet human spaceflight. These include a chapter on the Vostok and Voskhod programs, which left an indelible mark on early years of the “space race”; a lengthy meditation on the origins and early missions of the Soyuz program; and a gripping account of one of the most tragic episodes of the Soviet space program, the flight and death of cosmonaut Vladimir Komarov during the very first piloted Soyuz flight in 1967. Additional chapters cover robotic programs such as the Molniya communications satellite system, the Zenit spy satellite program, and the Luna series of probes that culminated in the world’s first survivable landing of a probe on the surface of the Moon. Chertok also devotes several chapters to the development of early generations of Soviet intercontinental ballistic missiles (ICBM) and missile defense systems; his narrative here skillfully combines technical, political, personal, and strategic concerns, highlighting how these considerations were often difficult to separate into neat categories. In particular, we learn about the Soviet drive to develop a workable solid propellant ICBM and the subsequent arguments over the development of second generation ICBMs in the late 1960s, a fight so acrimonious that contemporaries called it “the little civil war.”

Chertok’s chapter on the Cuban Missile Crisis provides a radically unique perspective on the crisis, from the point of view of those who would have been responsible for unleashing nuclear Armageddon in 1962 had Kennedy and Khrushchev not been able to agree on a stalemate. Two further chapters cover the untimely deaths of the most important luminaries of the era: Sergey Korolev and Yuriy Gagarin. Each of these chapters is a tour de force, as Chertok uses a vast array of published accounts to enrich his own personal recollections of the episodes. Finally, historians of Soviet science will find much of interest in the concluding chapter, which focuses on the relationship between the space program and the Soviet Academy of Sciences. This chapter represents one of the most insightful descriptions of the formation of a Soviet “aerospace” elite during the post-World War II era.

In the period covered by Chertok, from 1961 to 1967, the Soviet Union achieved an unprecedented series of firsts, the era that Russians still typically associate with a “golden age” of Soviet space exploration. Much as the Apollo missions indelibly convey a nostalgic sense of the possibilities of American space exploration, the visages of young “hero” cosmonauts from the early 1960s at Red Square parades continue to exemplify the immense political and cultural cachet of space exploration during the Cold War. The central figure in Chertok’s tale is Sergey Pavlovich Korolev, the “Chief Designer” of the leading missile and spacecraft design organization, who many consider the most important architect of the Soviet push for space and who is still eulogized in saintly terms in the post-Soviet landscape. Westerners who have written about the history of the Soviet space program typically fixate on Korolev to the exclusion of other actors. There are compelling reasons to do so: Korolev was an extraordinarily charismatic figure whose biography encompassed equal parts tragedy and redemption. His biographer Yaroslav Golovanov astutely noted that “Korolev was a most exact reflection of an epoch He knew all its triumphs and drained the cup of its bitterness to the dregs. Korolev’s biography is the concretization of the history of our land in one man”² Chertok’s description of

2. Yaroslav Golovanov, *Sergei Korolev: The Apprenticeship of a Space Pioneer* (Moscow: Mir Publishers, 1975), p. 293.

From the Chief Historian (continued)

Books, the Aeronautics and Space Report of the President, and the Aeronautics and Astronautics Chronology. We have published numerous books on NASA programs and have inaugurated—with the Science Mission Directorate—a large program on the History of the Scientific Exploration of Earth and Space (HSEES), filling a large gap in space history literature. Other gaps are being filled by books in progress, which include those documenting the history of NASA's life sciences, deep space navigation, aeronautics, and international relations. We have produced some innovative books, including Paul Dickson's *Dictionary of the Space Age*, with its *Oxford English Dictionary* approach to the etymology of Space Age terms. All the while, we have tried to disseminate our products to the wider public in accordance with the National Aeronautics and Space Act of 1958. In addition to the New Series in NASA History by Johns Hopkins University Press, our agreement with Dover Publications to reprint our out-of-print classics goes a long way toward accomplishing this goal.

In addition to our usual emphasis on aeronautics and space history, we have also taken the societal impact of spaceflight into our portfolio. Beginning with the eponymous conference proceedings, we have inaugurated a new NASA History subseries on societal impact, of which two more volumes, *Cosmos and Culture* and *Historical Studies in the Societal Impact of Spaceflight*, are in press. A nuanced and objective approach to the societal impact of spaceflight is important not only because the multigenerational programs under way will require the support of society, but also because of the need to foster a closer relationship between science and society in general.

Conferences and publications are only the tip of the iceberg. The NASA Historical Reference Collection, begun by Lee Saegesser and ably attended and supplemented by our archivists, is indispensable for a great deal of research and the large number of inquiries we receive both internally and externally. You will find the full scope of the NASA History Program described in the recently published third edition of *Research in NASA History: A Guide to the NASA History Program*. This Monograph in Aerospace History No. 43 is available free of charge upon request or online at <http://www.history.nasa.gov/series95.html>.

Finally, our fellowship programs through the American Historical Association, the Society for the History of Technology, and the History of Science Society not only assure our contact with some of the leading historical associations, but also foster high-quality research in NASA history.

All of this could not have been achieved without my dedicated staff at NASA Headquarters: Steve Garber as my right-hand man on book projects; Nadine Andreassen shepherding our contracts and grants, among many other duties; Chief Archivist Jane Odom, together with Colin Fries, John Hargenrader, and Liz Suckow, handling and making accessible the never-ending deluge of archives and the equally endless inquiries about space history. Glen Asner (now in the Office of the Secretary of Defense) also helped shepherd many of our projects, as do a continual stream of enthusiastic interns, many of whom have gone on to important positions inside and outside NASA. Our historians, archivists, and record managers at each of the 10 Centers do heroic work, often in the face of overwhelming odds. My sincere thanks to them all. It has been a joy working with them and my colleagues in the Office of External Relations and throughout NASA.

As this issue testifies with the obituaries of Konrad Dannenberg and Eilene Galloway, we are rapidly losing the final pioneers of the first 50 years of the Space Age. May the next 50 be as full of adventure, discovery, and surprise—and may NASA history document it with the same high standards of objectivity and scholarship that have characterized its first 50 years.

Thanks and farewell.

Steve

NEWS FROM HEADQUARTERS AND THE CENTERS

Headquarters

In the NASA History Division, Jane Odom continues to evaluate and acquire new material for the Historical Reference Collection (HRC). Additionally, she appraises material for historical value, directs the subsequent processing of collections, and answers reference requests. Specifically this quarter, Jane participated in an Office of General Counsel-led team charged with reviewing a dozen boxes from the Federal Records Center (FRC) in an attempt to locate responsive documents in a legal action against the Agency. Also, Jane assisted the Office of Security and Program Protection with a declassification review of several dozen documents. She and Colin Fries reviewed several hundred PDFs in the database in an effort to resolve an ongoing search issue. Jane, Colin, and John Hargenrader attended the NASA History Program Review and Training at Ames Research Center in late April. Jane gave a talk on management of the Headquarters Historical Reference Collection.

Collectively, Colin, John, and Liz Suckow all share reference duties, answering inquiries received by e-mail, assisting walk-in researchers, and helping Jane with Freedom of Information Act (FOIA) requests. Colin completed the scanning of a collection of speeches of key NASA managers. These approximately 300 speeches have been added to the internal database with plans under way to eventually publish them to the Internet. Colin is currently processing a collection of History Series unpublished manuscripts. Additionally, he assisted in proofreading several publications and continues to maintain the History Division Web pages.

John has completed the scanning of a collection of Office of Safety and Mission Assurance chronological correspondence files, 1986–2001. He is working to preserve deteriorating newspaper clippings and worn folders throughout the HRC, focusing on the early Administrators' files. John is processing a donation from former Headquarters engineer Charles King, appraising and adding King materials to the existing propulsion, Apollo, Apollo-Soyuz, and Skylab files.

Liz has completed the appraisal of a 31-cubic-foot collection of Apollo program history sources borrowed from the FRC, copying historically significant files from this collection to add to the HRC. She has begun a review of the next collection to be recalled from the FRC. It contains life sciences history sources, chronological correspondence files from a number of Headquarters offices, and papers of Langley

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News from Headquarters and the Centers (continued)

Research Center (LaRC) engineer and Headquarters official T. L. K. Smull. Liz is currently processing a small collection of papers received from Langley and also Manned Spacecraft Center engineer Jesse Phillips pertaining to the design of the Mercury, Gemini, and Apollo spacecraft as well as the Space Shuttle. In April, she participated in a brown bag presentation on the history of Headquarters facilities, including little-known facts about Headquarters buildings and personnel. Liz continues a preservation project on the satellites and space probes files by refolding and photocopying deteriorating materials. She also updated the Headquarters oral history inventory found at <http://history.nasa.gov/oralhistory/ohcatalog.htm> and attended a Society of American Archivists-sponsored workshop in Philadelphia on the archival care and use of photographs. And finally, Liz has completed the processing of a collection of files on the Space Flight Participant Program, including information on the teacher, journalist, and educator-astronaut in space programs.

Ames Research Center (ARC)

The American Institute of Aeronautics and Astronautics (AIAA) honored ARC as a 2009 AIAA Historic Aerospace Site. The Center plans a celebration in August when the plaque is dedicated as part of ARC's 70th-anniversary celebrations. The AIAA Board of Directors runs this effort in order to recognize "noteworthy and significant contributions made in both aeronautics and astronautics to culture and technology." More specifically, the selection committee recognized that

NASA Ames has witnessed events significant to aerospace history, hosted facilities of unique design and capability, and fostered the careers of people who forged aerospace history. By its selection as a 2009 Historic Aerospace Site, the AIAA pays tribute to NASA Ames' legacy of sustained, significant contribution to aerospace history. Like Silicon Valley which surrounds it, and since its founding in 1939, Ames has developed an organizational culture that encourages researchers to constantly reinvent themselves and drive important new fields. Ames pioneered the technology behind all reentry vehicles, starting with the blunt body concept. Ames developed simulation facilities such as arc jets and ballistic ranges, designed thermal protection systems for manned spacecraft, and engineered probes that blazed into the atmospheres of Venus and Jupiter. Ames people solved the complex aerodynamics of rotorcraft, of powered-lift VTOLs, tilt-rotors, and V/STOL aircraft. Ames people designed and built what was one of the world's greatest collections of wind tunnels, then supplemented them with the new technology of computational fluid dynamics. Ames led the development of simulators for human factors research, and made major improvements to air traffic management. In the exploration of space, NASA Ames engineered the Pioneer series of high-impact robotic explorers and other small satellites, launched the discipline of astrobiology and space sciences research in planetary atmospheres, and designed and operated airborne science platforms. As a site of sustained accomplishment in aerospace research and development, the NASA Ames Research Center fully merits this designation as an AIAA Historic Aerospace Site.

Jack Boyd gave a presentation to Google employees on the history of ARC. His presentation is available on YouTube at <http://www.youtube.com/watch?v=c0hfmb-qOgA>.

Students from all over the world will travel to ARC this summer to attend the International Space University (ISU). History of technology will be a persistent theme throughout the ISU summer session, and Jack Boyd will present a lecture on the history of NASA. The ARC and Headquarters History Offices teamed up to augment the traveling ISU library, donating 120 books and CDs on various topics in NASA history, which will become a permanent part of the ISU library. The ISU will conclude with a poster session extravaganza on Shenandoah Plaza, part of the celebrations surrounding ARC's 70th anniversary.

Our office welcomes two new interns this spring and summer. Jillian Slater, a graduate student from San Jose State University's School of Library and Information Science, comes on board as an archives intern to process a small collection of Don Wilson's Earth resource survey project files (Acc. 2007-013). Erik Blackburn, an undergraduate finishing up his B.A. in history at California State University East Bay, will support G. Warren Hall's research into ARC's contribution to rotorcraft and V/STOL aircraft development.

April Gage delivered a presentation titled "Art at a NASA Center" at the NASA History programmatic meeting, in which she discussed the Artwork series of the Artifact collection (ART1387) held in the History Office archives. In her presentation, April described collection management practices, provided biographical information about key artists, detailed two subseries of works from the 1970s and 1980s depicting the Pioneer project and space settlements, and explored differences between the NASA Art Program and works created for ARC.

April also authored a finding aid for a 23.5-cubic-foot collection, Public Affairs Office Records, 1940–2003 (number AFS1380). The finding aid is posted on the Online Archive of California at <http://www.oac.cdlib.org/findingaid/lark:/13030/kt2c6032rr>.

Dryden Flight Research Center (DFRC)

DFRC's Christian Gelzer recently served as a reviewer for a manuscript under consideration for publication in the aerospace field and has begun the groundwork for a new book, which he will edit, that focuses on the research conducted by a recently retired aircraft. The book will be something of a Festschrift for the aircraft, written by participants on the aircraft's programs over a 30-year span. Also, he hopes to have the truck fairing manuscript done by the end of June.

Curtis Peebles continues working on his comprehensive look at the Hyper-X program, which is expected to be complete by the end of the fiscal year. His second volume of *The Spoken Word* will be printed shortly.

Peter Merlin completed a draft of his monograph, *Ikhana: Unmanned Aircraft Systems Western States Fire Missions*. He has begun work on two chapters to appear in a multivolume series on NASA contributions to aeronautics being edited by Dick Hallion. He also presented two papers at a local chapter meeting of the AIAA, dubbed "AV-ation" for the Antelope Valley in which we lie.

Betty Love has begun sorting the large collection of Dale Reed's materials that will eventually be incorporated into the Center's historical collection.

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Glenn Research Center (GRC)

Archivist Bob Arrighi (Wyle) is working with the GRC Imaging Technology Center to develop an interactive history of the Center's aircraft from the 1940s to today. A list has been pared down of the aircraft to about 35 and photographs located for all. Brief histories are being written of the aircraft themselves and how they were utilized at Glenn.

Recent activity in our collection includes the transcription of George Lewis's talk at the groundbreaking for the Aircraft Engine Research Laboratory on 23 January 1941; the transcription and background information have been added to the collection. In addition, Abe Silverstein files in the Directors' Collection and Personal Papers are being reprocessed and prepared for scanning.

GRC is looking forward to a celebration of the 40th anniversary of the Apollo 11 Moon landing. The history office will be preparing a display outlining our contributions to the Apollo program and local reactions to the Moon landing. Archivist Bob Arrighi also provided material for an hour-long special that the local NBC affiliate, WKYC, aired this month, entitled "To The Moon: Ohio's Journey." A great deal of the text and footage seen during the first 20-minute segment of this special was provided by the archivist. The producer was provided with a synopsis of the Center's achievements relating to the space program, historical films to highlight each section, and photographs and information on Silverstein's naming of Mercury and Apollo. This documentary can be viewed in segments on the WKYC Web site at <http://www.wkyc.com>. Search "To the Moon."

Jet Propulsion Laboratory (JPL)

Erik Conway received the NASA Headquarters History Award at the annual program review at ARC. His work has been possible due to support from the NASA Headquarters History Office, the Science Mission Directorate, Langley Research Center, and JPL. Thanks to Nadine Andreassen, Blaine Baggett, Steve Dick, Debbie Douglas, Rob Ferguson, Mike Finneran, Steve Garber, Steven Kulczycki, Gail Langevin, Roger Launius, Donna Lawson, Jane Odom, Steve Sanford, and Margo Young for their assistance and encouragement over the last decade.

Erik attended the "Climate and Cultural Anxiety" workshop at Colby College at the end of March. This effort was supported by the National Science Foundation and is intended to result in a volume of the journal *Osiris*. His contribution to the conference was an analysis of how NASA became the largest funder of climate science in the United States. Publication of the volume is scheduled for 2011.

JPL is also beginning to work on a series of documentaries on its history. These will be similar to the Explorer 1 documentary done for the 50th anniversary of its launch in January 2008. The first will be a "prequel" covering the founding of JPL and its first few decades as an Army lab and is currently in production. We are currently interviewing veterans of JPL's lunar projects of the 1960s, Ranger and Lunar Surveyor, for the next entry in the series.

During 2008, Erik conducted 23 oral histories, primarily in support of the Mars robotic exploration history he is writing. He is currently researching and writing about the Mars Exploration Rover project.

Johnson Space Center (JSC)

The JSC history team continues its ongoing oral history project and has expanded its collection recently with another extensive interview with Pioneer Flight Director and former Center Director Christopher C. Kraft. He provided in-depth information on the development of the Space Shuttle program. This transcript will be posted online with the first of Kraft's interviews, where he shares an extensive insight into the historic decision process for Apollo 8.

The history team visited the Charles M. Schulz Museum in Santa Rosa, California, to visit the *To the Moon: Snoopy Soars with NASA* exhibit. Visitors to the museum will see part of an oral history interview conducted by the Houston history staff with Janye Flowers Coplin. The video features Coplin, a former secretary with the astronaut office, sharing the details of the unique farewell to the crew of Apollo 10 as they departed for the launchpad. With the crew on board the Command Module, named *Charlie Brown*, and the Lunar Module, named *Snoopy*, were a number of references to/drawings of the well-loved cartoon characters created by Schulz. The exhibit continues until 20 July 2009. For more information, refer to <http://www.charlesmschulzmuseum.org/pressreleases/20081212.html> and <http://www.charlesmschulzmuseum.org>. Schulz is also known for his longtime relationship with NASA and the "Silver Snoopy," given as part of NASA's Space Flight Awareness program for outstanding efforts that contribute to the success of human spaceflight missions.



On the way to the annual NASA history meeting, the JSC history team traveled to the Charles M. Schulz Museum to see the exhibit honoring the 40th anniversary of Apollo 10. Pictured above are (left to right) Sandra Johnson, JSC; Jennifer Ross-Nazzal, JSC; Jeannie Schulz, wife of Charles Schulz; Rebecca Wright, JSC; and Jane O'Cain, museum curator. The group enjoyed exchanging information about the special relationship that NASA shares with the Schulz family. Taking the photo was Don Fraser, who helped in creating the first group of Silver Snoopy pins used by NASA. He shared how he watched his friend "Sparky" Schulz create the drawing used as the model for the coveted award. The original drawing (1968) is on loan to the museum for the exhibit, courtesy of Fraser.

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Langley Research Center (LaRC)

Professor Susan Kern and a group of students from the College of William and Mary in Williamsburg, Virginia, recently visited LaRC. The students, enrolled in Professor Kern's class on the history of museums and historic preservation in the United States, were interested in touring the Langley 30-by-60-Foot Tunnel, a National Historic Landmark (NHL), now operated by Old Dominion University.

This tunnel was used as a setting in the soon-to-be-released motion picture thriller *The Box*, starring Cameron Diaz and James Marsden. Old Dominion currently uses the tunnel to teach aerospace engineering students about wind tunnel research and to provide a wind tunnel for graduate student projects. Initially known as the Full Scale Tunnel, it was designed by a group of Langley engineers that included Smith J. DeFrance, Abe Silverstein, and Harry Goett in the late 1920s. Construction was completed in 1931. Production aircraft with wingspans up to 40 feet can fit in the tunnel's test section. During World War II, nearly every U.S. fighter aircraft came to the 30-by-60-Foot Tunnel for drag clean-up studies. The tunnel also provides a capability for scale model aircraft to be free flown. Throughout its research life, the 30-by-60-Foot Tunnel has contributed to learning more about Mercury, Gemini, and Apollo spacecraft; supersonic transports; the blended wing body X-48 transport; the Rogallo parawing; and a reconstructed Wright Flyer, among other space- and aircraft.

For comparison, the students also toured the National Transonic Facility, NASA's newest large wind tunnel. A stop by the Variable Density Tunnel, another NHL currently on display on the Langley Reid Conference Center grounds, provided an example of how Langley preserves historic landmarks when feasible.

Former 30-by-60-Foot Tunnel research Branch Head Joseph Chambers gave an overview of past research conducted in the tunnel. Mary Gainer presented a historical perspective of building the tunnel, and Caroline Diehl presented her documentation of the significance of the tunnel for historic preservation purposes. All three presenters joined the students in a discussion of historic preservation issues at Langley.

The government access television station of Henrico County, Virginia, approached LaRC with a request to interview a researcher about flight research at the Center from World War II to the present for a documentary video about Virginia's contributions to aviation during that period. Former Langley Aeronautics Director Roy V. Harris, Jr., was interviewed for several hours with the Langley hangar and research aircraft serving as the set. Excerpts from the interview appear in the documentary along with photographs of and video clips about the Center's research. The documentary *Taking Flight—Stories of Modern Virginia Aviation* is available on Henrico County's government access television station. DVDs are available to museums.

Marshall Space Flight Center (MSFC)

Over the last several months, MSFC reported on the passing of two important members of Dr. Wernher von Braun's original German rocket team in Huntsville, Alabama: Dr. Ernst Stuhlinger and Mr. Konrad Dannenberg. Aside from the loss of two proponents of NASA history, their passing has also raised interest in the

number of oral histories that are on file regarding members of the German team and others who devoted their careers to MSFC and the exploration of space.

This has prompted the historian at MSFC to conduct a review of the oral histories available at MSFC and elsewhere regarding retired MSFC team members. In that review, the historian noted a collection of at least 50 interviews that the Center sponsored in the early 1990s related to the design, research, and development of the Space Shuttle and Space Station, including a number of videotaped interviews conducted by those associated with the space program in the community. For example, a few years ago, the University of Alabama in Huntsville served as the site for a series of interviews with MSFC retirees and others in the community who have been involved in the space program. In addition, the university's archives have a significant collection of oral history interviews related to the space program and MSFC. Also important are a series of interviews on file at MSFC that were conducted by historians Andrew Dunar and Stephen Waring, who authored the MSFC history book *Power to Explore*. The MSFC archives also contain numerous oral interviews that were conducted in connection with past anniversaries and Center celebrations.

It is interesting to note, however, that the historian's review has resulted in the realization that there are still other interviews that need to be conducted. Therefore, he has put in place a project to capture additional interviews from those in Huntsville and elsewhere who have been associated with the space exploration work at MSFC. This work is in progress.

Stennis Space Center (SSC)

For NASA, 2008 marked a half century of achievement and excellence in space exploration. For Stennis Space Center (SSC), it was a year that focused on looking back as well as to the future.

The shake, rattle, and roar of successful firing of the Space Shuttle main engine on 22 October 2008 completed the certification of the final flight engine built for the nation's Space Shuttle program, scheduled to end in 2010. Since 1975, SSC has tested every flight engine used in the Shuttle program, about 50 main engines in all for use on more than 120 flights. During that time, no mission failed as a result of engine malfunction.

In January 2008, SSC engineers performed 1A power pack tests for the J-2X engine being built to help humans go back to the Moon and possibly go beyond as part of NASA's Constellation Program. By late spring, engineers had completed a series of power pack tests, providing valuable data to use in refining the J-2X components. SSC will begin testing the new J-2X power pack in early 2010.

SSC also will be responsible for testing the full J-2X engine when it is completed. As was the case with the Apollo program, the path to go back to the Moon again runs squarely through SSC.

Also at SSC, construction of the new A-3 test stand continued as the first pieces of fabricated steel were lifted into place in October 2008. Steel continued to rise at the site through the winter and spring, with the final piece of structural steel fitted into place 9 April 2009.

RECENT PUBLICATIONS

NASA History Publications

Research in NASA History: A Guide to the NASA History Program (NASA SP-2009-4543), compiled by Steven J. Dick, Stephen J. Garber, and Jane Odom. This third edition updates information on the NASA history resources available in the Washington, DC, area and at the NASA Centers. Interested readers may obtain a free copy of this monograph by sending a self-addressed, stamped 9-by-12-inch envelope (\$2.84 domestic first-class postage for 13 ounces) to the NASA Information Center, NASA Headquarters, Washington, DC 20546, or by coming in person to the NASA History Division, room CO72, NASA Headquarters. An electronic version is available at <http://history.nasa.gov/sp4543.pdf>.

New Series in NASA History Printed by Johns Hopkins University Press

A Dictionary of the Space Age, New Series in NASA History, by Paul Dickson (The Johns Hopkins University Press, May 2009). This book is an unusually compelling, useful, and readable reference work. A greatly updated and expanded version of *The Origins of NASA Names* (NASA SP-4402, 1976), this new volume by an experienced lexicographer employs an *Oxford English Dictionary*-style approach to explain the etymology and first usage of both familiar and esoteric aerospace terms of the last half century.

NASA Publications Reprinted by Dover Publications

Chariots for Apollo: The NASA History of Manned Lunar Spacecraft to 1969, by Courtney G. Brooks, James M. Grimwood, and Loyd S. Swenson, Jr. (Dover Publications, April 2009). This illustrated history chronicles the development of the Apollo spacecraft and Lunar Modules, tracing their design, construction, testing, and operation in outer space. The book covers the period from the origins of NASA to the successful conclusion of the Apollo 11 mission. Originally published by NASA as SP-4205, 1979, this edition features a new introduction by author Paul Dickson.

Commercially Published Works

Compiled by Chris Gamble

Mapping and Naming the Moon: A History of Lunar Cartography and Nomenclature, by Ewen A. Whitaker (Cambridge University Press, August 2008). Almost 30 years after the Apollo missions, Tranquility Base, Hadley Rille, and Taurus-Littrow are names still resonant with the enormous achievements represented by the lunar landings. But how did these places get their names? Who named the Copernicus crater? Where did all those names on lunar maps come from, and what stimulated their selection? Ewen Whitaker traces the origins and evolution of the present-day systems for naming lunar features such as craters, mountains, valleys, and dark spots. Beautiful lunar maps spanning four centuries of progress wonderfully illustrate the unfolding of our ability to map the Moon. Rare, early photographs add to the sense of history.

Global TV: New Media and the Cold War, 1946–69, by James Schwoch (University of Illinois Press, December 2008). James Schwoch presents a unique retelling of the Cold War period by examining the relationship of global television, diplomacy, and new electronic communications media. Beginning with the Allied occupation of Germany in 1946 and ending with the 1969 Apollo Moon landing, this book explores major developments in global media, including the postwar absorption of the International Telecommunications Union into the United Nations and its impact on both television and international policy, the rise of psychological warfare and its relations to new electronic media of the 1950s, and the role of the Ford Foundation in shaping global communication research concepts.

Severe Space Weather Events—Understanding Societal and Economic Impacts, by National Academies Press (December 2008). As a first step toward determining the socioeconomic impacts of extreme space weather events (power grid outages, high-frequency communication blackouts, spacecraft anomalies) and addressing the questions of space weather risk assessment and management, a public workshop was held in May 2008. The workshop brought together representatives of industry, government, and academia to consider both direct and collateral effects of severe space weather events, the current state of the space weather services infrastructure in the United States, the needs of users of space weather data and services, and the ramifications of future technological developments for contemporary society's vulnerability to space weather. The workshop concluded with a discussion of unexplored or underexplored topics that would yield the greatest benefits in space weather risk management.

Future Spacecraft Propulsion Systems: Enabling Technologies for Space Exploration, by Paul A. Czysz and Claudio Bruno (Springer-Praxis, 2nd ed., March 2009). In this second edition of *Future Spacecraft Propulsion Systems*, the authors demonstrate the need to break free from the old, established concepts of expendable rockets that used chemical propulsion and to develop new breeds of launch vehicle capable of both launching payloads into orbit at a dramatically reduced cost and conducting sustained operations in low-Earth orbit. The next steps to establishing a permanent presence in the solar system beyond Earth are the commercialization of sustained operations on the Moon and the development of advanced nuclear or high-energy space propulsion systems for solar system exploration out to the boundary of interstellar space.

New Horizons: Reconnaissance of the Pluto-Charon System and the Kuiper Belt, edited by C. T. Russell; reprinted from *Space Science Reviews*, vol. 140/1–4, 2008 (Springer, April 2009). The New Horizons mission provides the first in situ reconnaissance of the Pluto-Charon system and the Kuiper belt, arguably the last frontier of solar system exploration. This book describes the mission, its objectives, expected results, and instruments in articles written by the scientists and engineers most closely involved. The New Horizons mission is expected to return unique observations and discoveries that will revolutionize our understanding of the formation of the solar system.

Images of America: White Sands Missile Range, by Darren Court and the White Sands Missile Range Museum (Arcadia Publishing, January 2009). Since the official flag raising on 9 July 1945, the White Sands Missile Range has become an integral part of global defense for the United States. A mere week after formation, Project Trinity tested the first atomic bomb at an isolated site that was 100 miles north on what was then part of the Alamogordo Bombing Range—a test site for B-17 pilots. Back at White Sands Proving Ground, as it was then named, personnel were unaware of the massive new weapon tested to their north. Instead their focus was

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Recent Publications (continued)

upon the arrival of what would be 300 railroad cars of captured German V-2 rockets and associated equipment. Later that year, over 100 captured German scientists, among them Wernher von Braun, would arrive at White Sands to assist in V-2 technology, launching America's race to space; tens of thousands of rockets and missiles have since been fired on the range. Thousands of family members also lived and worked at the range; their stories can be found inside as well.

Krafft Ehrlicke's Extraterrestrial Imperative, by Krafft Ehrlicke and Marsha Freeman (Apogee Books Space Series/Collector's Guide Publishing, Inc., February 2009). A summation of Krafft Ehrlicke's work on encouraging the exploration of space, this account offers biographic information on the man himself; encompasses details of his new, innovative ideas; and portrays his thoughts on the importance and value of space travel for society. Historic and yet topical, this resource also includes many of Ehrlicke's original works, many of which were previously out of print.

Faster Than Sound: The Story of Supersonic Flight, by Bill Gunston (Haynes Publishing; 2nd edition, February 2009). This is the thrilling story of how test pilots in the United States and United Kingdom first pierced the sound barrier in the late 1940s. Much has happened since then, and as recently as 2003 thousands of fare-paying passengers were routinely enjoying intercontinental air travel at speeds of up to Mach 2. The author describes in accessible style the rules and technologies of supersonic flight, ongoing developments in engine and airframe technology, the age of supersonic passenger transports like Concorde, and advances in supersonic fighter and bomber design.

Exploding Superstars: Understanding Supernovae and Gamma-Ray Bursts, by Alain Mazure and Stéphane Basa (Springer-Praxis, February 2009). The exceptional cosmic history and the fabulous destinies of exploding stars—supernovae and gamma-ray bursters—are highly fertile areas of research and are also very special tools to further our understanding of the universe. In this book, the authors throw light on the assemblage of facts, hypotheses, and cosmological conclusions and show how these “beacons” illuminate their immediate surroundings and allow us to study the vast cosmos, like searchlights revealing the matter composing our universe.

Probing the New Solar System, by John Wilkinson (CSIRO Publishing, February 2009). Exploration by space probes has revealed many fascinating details about Earth's planetary neighbors. This book discusses the latest findings that have contributed to a changed understanding of the solar system—and how the revised definition of a planet in 2006 by the International Astronomical Union affected this understanding—offering an up-to-date record of the many recent discoveries made about our solar system and other planetary systems using ground-based and space probe technology.

ROSETTA: ESA's Mission to the Origin of the Solar System, edited by Rita Schulz, Claudia J. Alexander, Hermann Boehnhardt, and Karl-Heinz Glassmeier. Partially reprinted, with updates and corrections, from the *Space Science Reviews*, vol. 128/1–4, 2007 (Springer, March 2009). *ROSETTA: ESA's Mission to the Origin of the Solar System* is the first book of its kind, which discusses the European Space Agency's (ESA) science and instrumentation involved in the Planetary Cornerstone Mission, ROSETTA. Comets consist of the most primitive material in the solar system. An in-depth study of this material could provide us with the knowledge to understand the earliest epoch of the solar system's formation. Until now, our knowledge of comets has come from Earth-based telescopes and flyby missions. Rosetta will be

the first-ever spacecraft to rendezvous with a comet and go into orbit around the nucleus. Rosetta will also land on the surface of the comet with its lander Philae to perform dedicated in situ analysis of the comet nucleus composition and structure.

The THEMIS Mission, edited by James L. Burch and Vassilis Angelopoulos. Reprinted from *Space Science Reviews*, vol. 141/1–4, 2008 (Springer, February 2009). The Time History of Events and Macroscale Interactions during Substorms (THEMIS) mission aims to determine the trigger and large-scale evolution of substorms by employing five identical microsatellites which line up along Earth's magnetotail to track the motion of particles, plasma, and waves from one point to another and, for the first time, resolve space-time ambiguities in key regions of the magnetosphere on a global scale. The probes also traverse the radiation belts and the dayside magnetosphere, allowing THEMIS to address additional baseline objectives. This volume describes the mission, the instrumentation, and the data derived from them.

Planetary Crusts: Their Composition, Origin and Evolution, by S. Ross Taylor and Scott McLennan (Cambridge University Press, January 2009). This is the first book ever published to explain how and why solid planets and satellites develop crusts. It presents a geochemical and geological survey of the crusts of the Moon, Mercury, Venus, Earth, Mars, the asteroid Vesta, and several satellites such as Europa, Ganymede, and Callisto. After describing how solar system bodies are formed, the authors compare the different planetary crusts and discuss current controversies on the subject. Extensively referenced and annotated, this book presents an up-to-date survey of the scientific problems of crustal development.

The Hinode Mission, edited by Takashi Sakurai. Reprinted from *Solar Physics Journal*, vol. 243/1, 2007, and vol. 249/2, 2008 (Springer, February 2009). The Solar-B satellite was launched in 2006 by the Institute of Space and Astronautical Science, Japan Aerospace Exploration Agency (ISAS/JAXA) and was renamed Hinode ("sunrise" in Japanese). This book gives a comprehensive description of the mission that carries three instruments: the X-Ray Telescope (XRT), the Extreme Ultraviolet Imaging Spectrometer (EIS), and the Solar Optical Telescope (SOT). Hinode is the Japanese mission for solar physics with contributions from NASA and ESA.

Frontiers of Propulsion Science, by Marc G. Millis and Eric W. Davis (AIAA, February 2009). *Frontiers of Propulsion Science* is the first-ever compilation of emerging science relevant to such notions as space drives, warp drives, gravity control, and faster-than-light travel—the kind of breakthroughs that would revolutionize spaceflight and enable human voyages to other star systems. Although these concepts might sound like science fiction, they are appearing in growing numbers in reputable scientific journals.

History of Rocketry and Astronautics, vol. 30, edited by Otfried G. Liepack, American Astronomical Society History Series (IAA History Symposia, vol. 20, 2009). This volume contains the proceedings of the 34th History Symposium of the International Academy of Astronautics (IAA) in Rio de Janeiro, Brazil, 2000.

Space Shuttle Main Engine: The First Twenty Years and Beyond, by Robert E. Biggs (American Astronomical Society History Series, vol. 29, 2008). In this volume is a description of the history of the design, development, and production of Space Shuttle Main Engine by the Rocketdyne Division of Rockwell International, under contract with MSFC, after having won the competitive bid to do this arduous task in July 1971. Included are the details of the many technical, logistical, and

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Recent Publications (continued)

managerial difficulties solved by the team of thousands of specialists at Rocketdyne and MSFC—things such as engine design and operating characteristics, program requirements, goals, schedule difficulties, and problem solutions.

Missiles for the Fatherland: Peenemünde, National Socialism, and the V-2 Missile, by Michael B. Petersen (Cambridge University Press, February 2009). *Missiles for the Fatherland* tells the story of the scientists and engineers who built the V-2 missile in Hitler's Germany. This is the first scholarly history of the culture and society that underpinned missile development at Germany's secret missile base at Peenemünde. Using mainly primary source documents and publicly available oral history interviews, Michael Petersen examines the lives of the men and women who worked at Peenemünde and later at the underground slave labor complex called Mittelbau-Dora, where concentration camp prisoners mass-produced the V-2.

Tom Sachs: Space Program, by Tom Sachs with contributions from Buzz Aldrin, Louise Neri, and Arthur C. Danto (Rizzoli, February 2009). For over a decade, Sachs has pondered the technical ingenuity and romance with the unknown that brought America the Apollo program. This publication documents the culmination of his research: the realization of his own life-size space program, composed of three main sculptural elements (Lunar Module, Mission Control, and Space Suit) and a flight plan, all put to use during a live demonstration of a lunar landing. In his exuberant manufacture of objects and scenarios, Sachs asks barbed questions of modern creativity that relate to conception, production, consumption, and circulation.

Launching Science: Science Opportunities Provided by NASA's Constellation System, by the Committee on Science Opportunities Enabled by NASA's Constellation System and National Research Board (National Academies Press, February 2009). In January 2004, NASA was given a new policy direction known as the Vision for Space Exploration. That plan, now renamed the United States Space Exploration Policy, called for sending human and robotic missions to the Moon, on to Mars, and beyond. In 2005, NASA outlined how to conduct the first steps in implementing this policy and began the development of a new human-carrying spacecraft known as Orion, the lunar lander known as Altair, and the launch vehicles Ares I and Ares V. Collectively, these are called the Constellation System. In November 2007, NASA asked the National Research Council (NRC) to evaluate the potential for new science opportunities enabled by the Constellation System of rockets and spacecraft. The NRC committee evaluated a total of 17 mission concepts for future space science missions. Of those, the committee determined that 12 would benefit from the Constellation System and 5 would not. This book presents the committee's findings and recommendations, including cost estimates, a review of the technical feasibility of each mission, and identification of the missions most deserving of future study.

The Rockets and Missiles of White Sands Proving Ground: 1945–1958, by Gregory P. Kennedy (Schiffer Publishing, Ltd., March 2009). In 1945, the United States Army established a testing center for rockets and guided missiles in south-central New Mexico. Named White Sands Proving Ground, this center was the locale for many of America's first steps towards space. *Rockets and Missiles of White Sands Proving Ground* chronicles major activities at the base from 1945 to 1958. During this period, the Army, Navy, and Air Force all tested missiles at the desert installation. This book details the development and testing for such missiles as Hermes, Corporal, Nike Ajax, Sergeant, Honest John, and Viking. These missiles formed the backbone of much of America's arsenal during the Cold War and represented major

technological advancements. In 1958, the White Sands Proving Ground became the White Sands Missile Range, as it is known today.

Satellite Remote Sensing for Archaeology, by Sarah H. Parcak (Routledge, March 2009). This handbook is the first comprehensive overview of the field of satellite remote sensing for archaeology and how it can be applied to ongoing archaeological fieldwork projects across the globe. It provides a survey of the history and development of the field, connecting satellite remote sensing in archaeology to broader developments in remote sensing, archaeological method and theory, cultural resource management, and environmental studies. With a focus on practical uses of satellite remote sensing, Sarah H. Parcak evaluates satellite imagery types and remote sensing analysis techniques specific to the discovery, preservation, and management of archaeological sites.

Organizational Learning at NASA: The Columbia and Challenger Accidents, by Julianne G. Mahler and Maureen Hogan Casamayou (Georgetown University Press, April 2009). Just after 9:00 a.m. on 1 February 2003, the Space Shuttle *Columbia* broke apart and was lost over Texas. This tragic event led, as the *Challenger* accident had 17 years earlier, to an intensive government investigation of the technological and organizational causes of the accident. The investigation found chilling similarities between the two accidents, leading the Columbia Accident Investigation Board to conclude that NASA failed to learn from its earlier tragedy. Despite the frequency with which organizations are encouraged to adopt learning practices, organizational learning—especially in public organizations—is not well understood and deserves to be studied in more detail. This book fills that gap with a thorough examination of NASA's loss of the two Shuttles.

Space, Propulsion & Energy Sciences International Forum, SPESIF-2009, Huntsville, Alabama, 24–26 February 2009, edited by Glen A. Robertson (American Institute of Physics, April 2009). The SPESIF-2009 technical program features a broad spectrum of topics on space, propulsion, and energy science. These topics span the range from basic research to recent technology advances and hardware testing among academia, industry, and government. Included were forums on astrosociology, new frontiers in propulsion science, and thermal applications in microgravity, with workshops on future energy sources, high-frequency gravitational waves, and future directions in space science and technology.

Space Conquest: The Complete History of Manned Spaceflight, by Francis Dreer (Haynes Publishing, January 2009). The greatest ever feat of science and technology in the history of humankind was when the United States' Apollo 11 landed men on the surface of the Moon and returned them safely to Earth. The great ideological struggle of the Cold War between the United States and the Soviet Union was defined by the space race—a race that was won by the Americans. This stunningly illustrated story of that race covers the Soviet and American space programs and Neil Armstrong's historic "one small step for man" in July 1969, and continues into the era of space stations and reusable spacecraft like the Shuttle.

License to Orbit: The Future of Commercial Space Travel, by Joseph Pelton and Peter Marshall (Apogee Books Space Series/Collector's Guide Publishing, Inc., April 2009). Two leading experts on space systems with decades of experience in the field provide important and current insights on developments in today's commercial space industry in this ambitious and extensively researched examination.

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The authors look at the lives, ambitions, and struggles of the billionaires funding and supporting this industry, while also examining the nature of the strained relations and alternative goals of space agencies versus the private spaceflight industry. The analysis even includes descriptions of the amazing new technologies that could revolutionize space exploration and space industries in the coming decades.

Deep Space Craft: An Overview of Interplanetary Flight, by Dave Doody (Springer-Praxis, April 2009). *Deep Space Craft* opens the door to interplanetary flight. It looks at this world from the vantage point of real operations on a specific mission and follows a natural trail from the day-to-day working of this particular spacecraft, through the functioning of all spacecraft, to the collaboration of the various disciplines to produce the results for which a spacecraft is designed. The author shows how, in order to make sense of all the scientific data coming back to Earth, the need for experiments and instrumentation arises, and he follows the design and construction of the instruments through to their placement and testing on a spacecraft prior to launch. Examples are given of the interaction between an instrument's science team and the mission's flight team to plan and specify observations, gather and analyze data in flight, and finally present the results and discoveries to the scientific community.

Threats, Risks, and Sustainability: Answers by Space: Studies in Space Policy, vol. 2, edited by Kai-Uwe Schrogl, Charlotte Mathieu, and Agnieszka Lukaszczyk (Springer, April 2009). At least until 2050, development is challenged by a strong population growth, more severe environmental strains, growing mobility, and dwindling energy resources. All these factors will lead to serious consequences for humankind. Inadequate agricultural resources, water supply, and nonrenewable energy sources; epidemics; climate change; and natural disasters will further heavily impact human life. The European Space Policy Institute sheds a new light on threats, risks, and sustainability by combining approaches from various disciplines. It analyzes what could be the contribution of space tools to predict, manage, and mitigate those threats. It aims at demonstrating that space is not a niche but has become an overarching tool in solving today's problems.

Discovering the Expanding Universe, by Harry Nussbaumer and Lydia Bieri (Cambridge University Press, May 2009). The discovery of the expanding universe is one of the most exciting exploits in astronomy. This book explores its history, from the beginnings of modern cosmology with Einstein in 1917, through Lemaître's discovery of the expanding universe in 1927 and his suggestion of a Big Bang origin, to Hubble's contribution of 1929 and the subsequent years when Hubble and Humason provided the essential observations for further developing modern cosmology, and finally to Einstein's conversion to the expanding universe in 1931.

Success Stories in Satellite Systems, by D. K. Sachdev (AIAA, 2009). This unique book presents firsthand histories, case studies, and lessons learned from many of the pioneers who built the satellite industry. They share the experiences, technologies, and business challenges that led to the successful development of an industry that is woven into the very core of our everyday lives. Historically important photographs throughout the book help to illuminate these compelling narratives.

Safety Design for Space Systems, by Tommaso Sgobba, Axel Larsen, and Gary Musgrave (Butterworth-Heinemann, April 2009). Fully supported by the International Association for the Advancement of Space Safety, written by the

leading figures in the industry, with frontline experience from projects ranging from the Apollo missions and Skylab to the Space Shuttle and the International Space Station, this book provides a comprehensive reference for aerospace engineers in the industry. It addresses each of the key elements that affect space systems safety, including the space environment (natural and induced), human physiology in space, human rating factors, emergency capabilities, launch propellants and oxidizer systems, life-support systems, battery and fuel cell safety, nuclear power generators safety, habitat activities, fire protection, safety-critical software development, collision avoidance systems design, and operations and on-orbit maintenance.

Truth, Lies, and O-Rings: Inside the Space Shuttle Challenger Disaster, by Allan J. McDonald and James R. Hansen (University Press of Florida, April 2009). On a cold January morning in 1986, NASA launched the Space Shuttle *Challenger* despite warnings against doing so by many individuals, including Allan McDonald. The fiery destruction of *Challenger* on live television moments after launch remains an indelible image in the nation's collective memory. In *Truth, Lies, and O-Rings*, McDonald, a skilled engineer and executive, relives the tragedy from where he stood at Launch Control Center. *Truth, Lies, and O-Rings* is the first look at the *Challenger* tragedy and its aftermath from someone who was on the inside, recognized the potential disaster, and tried to prevent it. It also addresses the early warnings of very severe debris issues from the first two post-*Challenger* flights, which ultimately resulted in the loss of *Columbia* some 15 years later.

One Giant Leap: Apollo 11 40 Years On, by Piers Bizony (Zenith Press, May 2009). The first Moon landing in July 1969 captured the imagination of the world as no subsequent "space spectacular" has. Forty years later, space historian Piers Bizony has produced a stunning visual record of this unparalleled mission. Drawing on high-resolution images from the entire suite of Apollo 11's on-board film magazines, the book presents a complete picture of the mission: the launch, the astronauts' lives inside the spacecraft, the landing and Moon walk, and finally the return to Earth to worldwide acclaim. Accompanying these images is Bizony's essay on the lasting cultural and emotional impact of the mission, augmented with quotes from astronauts, scientists, and literary commentators.

Space Technologies for the Benefit of Human Society and Earth, edited by Phillip Olla (Springer, May 2009). When discussing the advancement of space science and space technology, most people instinctively think about deep space flights, lunar stations, and thrilling outer space adventures. The fact is that the majority of the human technology in space, which consists of interconnected satellites, points towards Earth and is used to provide services for and fulfill the goals of people on planet Earth. This book describes some of the most important applications being developed, along with the space infrastructure upgrades being implemented to support them. It also provides a comprehensive review of how space technology can be used to resolve fundamental environmental, technological, and humanitarian challenges that we are experiencing on our planet.

From Tajikistan to the Moon: A Story of Tragedy, Survival and Triumph of the Human Spirit, by Robert Frimtzis (Ecliptic Publishing, June 2009). *From Tajikistan to the Moon* is an inspirational, true story of the spellbinding events of World War II, the author's escape from his war-torn country, his flight to freedom, and his ultimate success in America. Told from a unique Soviet perspective, Robert Frimtzis takes

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you from surviving bombs of the Nazi blitzkrieg, to imminent starvation and deprivation in a mud hut in Tajikistan, to contributing to America's lunar exploration and spacecraft development.

Chasing Icarus: The Seventeen Days in 1910 That Forever Changed American Aviation, by Gavin Mortimer (Walker & Company, April 2009). By 1910—seven years after the Wright brothers first lifted a plane off the ground at Kitty Hawk—America and the world were transfixed by the danger and challenge of mastering the air. Yet which form of flight would predominate was far from clear—dirigibles, balloons, and airplanes all had their passionate advocates. The great dirigible *America*, captained by Walter Wellman, lifted off from New Jersey and for several turbulent days attempted to be the first flying machine to cross the Atlantic. From St. Louis, ballooning teams from around the world took off in pursuit of the Gordon Bennett International Balloon Cup. And at the famed racetrack at Belmont Park, New York, huge crowds gathered to watch airplane pilots race above the oval and attempt to set speed, altitude, and distance records. During the 17 days in October 1910 that Gavin Mortimer vividly recounts in *Chasing Icarus*, the question of primacy in the air was on full display, after which the future of aviation was never in doubt.

Aeronautics: A Graphic History, vol. 1, by Eric Stoffel, Marcel Uderzo, and Frank Coste (Bezouze, France: Ideesplus Publisher, 2008). During a visit to the Bourget Airport, a boy called Axel starts asking his father questions. The father is himself a pilot and the son of a pilot—this begins a story of the most significant events in aeronautics, from the first kites flown by the Chinese in ancient times, to Blériot's crossing of the English Channel in 1909. The human adventure of a dream come true—the dream of flying.

Space Commercialization and the Development of Space Law from a Chinese Legal Perspective, by Yun Zhao (Nova Science Publishers, April 2009). This will be the first English book on space law written by a Chinese scholar. With the rapid development of space activities in China, many space scientists and lawyers are keen to know Chinese legal perspectives on policies and laws on space activities. The book discusses new development of space law in view of the rapid development of space commercial activities.

Next Generation of Human Space Flight Systems, edited by Alfred T. Chesley (Nova Science Publishers Inc., April 2009). This book is dedicated to important issues concerning Space Shuttle retirement and transition to the next generation of human spaceflight systems. Chesley places emphasis on the issues of costs, suppliers, transition progress, environmental risks, and mission identification and scope.

Media, NASA, and America's Quest for the Moon, by Harlen Makemson (Peter Lang Publishing, May 2009). When Apollo 11 landed on the Moon in July 1969, it capped not only the most remarkable engineering feat in history, but also a decade-long battle over how much access the press and public should have to the crewed space program. This book tells the behind-the-scenes story of how NASA and the U.S. media were often at odds but ultimately showed extraordinary cooperation in bringing the story of lunar conquest to the world.

The ARRL Satellite Handbook, by Steve Ford (American Radio Relay League, February 2009). The *ARRL Satellite Handbook*, by QST Editor Steve Ford, WB8IMY, brings the thrill of satellite communications within your reach. Filled

with understandable descriptions and illustrations, this book includes all the tools you need to participate in this exciting field. This very readable guide was designed to give a broad introduction to the subject of satellite communications, while providing the practical fundamentals you need to explore, track, and operate ham radio satellites on your own.

Launching a New Mission: Michael Griffin and NASA's Return to the Moon, by W. Henry Lambright (IBM Center for the Business of Government, 2009). President George W. Bush told NASA to return to the Moon and prepare for crewed exploration of Mars. The man he put in charge, Michael Griffin, was a certified rocket scientist with a passion for crewed space exploration. In the four years he served as NASA Administrator, Griffin was continually forced to make controversial financial tradeoffs that brought him into conflict with constituencies who disagreed with him. He did, however, make significant progress in redirecting NASA toward the new Moon-Mars program. This report provides insights into the challenge of managing large, controversial programs in government. It also offers lessons for both the next NASA Administrator and other public executives who are expected to lead in challenging political and fiscal environments.

Spacesuits: Within the Collections of the Smithsonian National Air and Space Museum, by Amanda Young and Mark Avino (Power House Books, May 2009). The goal of landing a man on the Moon and returning him safely to Earth required the development of three things: spacecraft, launch vehicles, and protective clothing. *Spacesuits: Within the Collections of the Smithsonian National Air and Space Museum* takes the reader through the development of the last category, the spacesuits used during this venture. Highlighting the pressure suits created during the years leading up to the lunar missions and beyond, this book features dramatic photographs of the Smithsonian's collection, as well as never-before-published historical images of spacesuit development and testing—range-of-motion studies, for example, in which researchers wore spacesuits while playing baseball and football. The book also includes a group of advanced spacesuits, which, though never used on a mission, are in many respects the most exciting suits ever created.

La Naissance d'Ariane [The Birth of Ariane] by Jean-Pierre Morin (Editions Edite, April 2009). In the early 1970s, western European countries could launch their payloads one of two ways, with the United States or not at all. By the 1980s, Europe had developed its own independent launch vehicle, the Ariane, and rose from the United States' junior partner to its competitor in launch services. *La Naissance d'Ariane* chronicles the technological and political challenges of this achievement.

ONLINE RESOURCES

<http://history.nasa.gov/lap10fjl>

The *Apollo 10 Flight Journal*, created by David Woods with the assistance of Ian Roberts and Robin Wheeler, richly documents the journey of Apollo 10 literally from Earth to the Moon and back. It contains an extensively annotated mission transcript, supporting technical documents, photos, and more. It is a companion to the Flight Journals for the Apollo 8, 9, 11, 12, 15, and 16 missions (<http://history.nasa.gov/lafjl>) and to Eric Jones's *Apollo Lunar Surface Journal* (<http://history.nasa.gov/lalsjl>).

HISTORIC PRESERVATION NEWS

Ames Research Center Receives 2008 Preservation Design Award

Ames Research Center was the recipient of a 2008 Preservation Design Award from the California Preservation Foundation (CPF) for the “Cultural Resources Studies and Reports” category. Center Director Pete Warden congratulated Keith Venter, Historic Preservation Officer, Code RCE, for his outstanding leadership and Tom Anderson, Senior Environmental Compliance Specialist, Integrated Science Solutions, Inc. Together with Rich Sucre of Page & Turnbull, San Francisco, they prepared the report on “Evaluation of Historic Resources Associated with the Space Shuttle Program at Ames Research Center.” The Ames Environmental and History offices also provided important support that led to this prestigious recognition. In announcing the award, CPF executive director Cindy Heitzman praised the team for its “exemplary contribution to the preservation of California’s rich and diverse historic resources.”

The award was presented at a ceremony on 18 October 2008, in Long Beach, California, aboard the Queen Mary. Wayne Donaldson, California State Historic Preservation Officer, was the MC of the event and stated that while California’s research facilities have spurred worldwide technology innovations, they are often overlooked by traditional historic resource surveys. This report examines structures that are part of the “contemporary history”: laboratories and buildings where NASA developed the Space Shuttle.



Participating in the ceremony are Tom Anderson and Mike Makinen of Ames Research Center and Cora Palmer and Rich Sucre of Page & Turnbull.



Participating in the unveiling were (left to right) Bill Schultz, chairman of the VAHS Historical Marker Committee; Randall Burdette, director of the Virginia Department of Aviation; Dr. John Campbell, director of NASA's Wallops Flight Facility; Ron Wolff, chairperson of the Accomack County Board of Supervisors; and Joanna Wilson, Virginia Department of Historic Resources. Photo Credit: NASA.

Highway Marker Recognizes Wallops Flight Facility, Virginia, as One of the Oldest Launch Sites in the World

A Virginia historical marker recognizing the contributions of NASA's Wallops Flight Facility (WFF) to aerospace research was unveiled on 22 November 2008 at the entrance to the NASA Visitor Center on Route 175. The nomination of Wallops as a historic site was provided by the Virginia Aeronautical Historical Society (VAHS) and supported by the Virginia Department of Historic Resources and the Virginia Department of Aviation.

Established in 1945 by the National Advisory Committee for Aeronautics (NACA), Wallops is one of the oldest launch sites in the world. Tiamat, the Army Air Forces' first air-to-air guided missile, was the first rocket tested at the NACA Langley Field Station at Wallops Island. Ten of these missiles were launched from Wallops Island, Virginia, beginning on 4 July 1945. Originally the purpose of the program was to develop a missile for combat use; however, with the close of the war, this was changed to research on automatic control systems.

Wallops Flight Facility Designates Historic Preservation Officer

WFF announces the designation of Randy Stanley as its new Historic Preservation Officer (HPO). He joins NASA's team of 13 HPOs assigned to oversee compliance with the National Historic Preservation Act (NHPA). The former WFF HPO, Paul Neidinger, left NASA last year to relocate to Texas with his family.

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Historic Preservation News (continued)

With a degree in architectural engineering technology, Randy moved from his home state of West Virginia to the Eastern Shore of Virginia in 1985 to work as a contractor at WFF. In 1991, he joined the WFF Facilities Engineering Branch managing larger rehabilitation and modification. In January 2009, after working for four contractors at WFF, Randy became a NASA civil servant, joining the Agency's Facilities Management Branch as the Architect/Staff Engineer.



Randy Stanley.

Randy's primary HPO duty is to review planned NASA programs and projects and determine if consultation is triggered under the NHPA implementing regulations. He is already leading negotiations with the Virginia Department of Historic Resources in Richmond involving several ongoing projects. Having worked in most of the buildings at Wallops, Randy brings sound insight into the mission and history of WFF. He also brings a focus on the importance of communicating historic resource data through Geographic Information Systems applications and master planning.



Olga Dominguez (right), Assistant Administrator, Office of Infrastructure, and Tina Norwood (center), NASA Federal Preservation Officer, received the award from Susan Barnes, Deputy Chair of the ACHP, during a ceremony held 20 February at the Library of Congress, Washington, DC.

NASA Receives Preserve America Award

In February 2009, NASA received the Advisory Council on Historic Preservation Award for "Federal Preservation America Accomplishment" from the ACHP. The award states that NASA "has responded in an exemplary manner to the Executive Order, 13287, Preserve America, Section 3 requirement to report to the President and the Secretary of the Interior on the identification, protection, and use of historic properties within federal agency inventories every three years. With the forthcoming phase-out of the Shuttle Program, NASA has made tremendous strides in

the past three years to expand its inventory of historic properties through identification and protection of them, and their rehabilitation for continued use in future programs. NASA demonstrated through coordination among its 10 centers across the U.S. that commitments made in 2005 have been followed through by the agency."

John Wesley Powell Award Given to Glenn Archivist Bob Arrighi

Bob Arrighi was honored with the John Wesley Powell Award from the Society for History in the Federal Government (SHFG) for his CD on the former Altitude Wind Tunnel (AWT) located at Glenn Research Center, Ohio.

Each year the society awards six prizes for various types of historical publication and work furthering the understanding and history of the federal government. The John Wesley Powell Award is given for any form of interpretive historical presentation including, but not limited to, museum exhibits, historical films, CDs, Web sites, or multimedia displays. John Wesley Powell was the second director of the U.S. Geological Survey but is most famous for his early explorations of the American West, including the 1869 Powell Geographic Expedition that included the first passage through the Grand Canyon. The Powell prize is given to either an individual or to principal collaborators for a single major effort completed within the two calendar years immediately preceding the year in which the award is announced. The winners were announced in the annual meeting of the society held 18–19 March 2009 at the National Archives and Records Administration in Washington, DC.

The interactive history includes a chronological history, photographic surveys, over 200 still images, historic video footage, and links to over 70 reports and publications. It is just one piece of the larger effort to document the AWT before its demolition. The project included gathering documents from a variety of sources, scanning of hundreds of images, digitizing numerous historic films, conducting oral histories, and researching information on the facility, its tests, and significance to the aerospace community. The information is being distributed to the public through a number of methods including a book that is now in final review, a documentary video, a Web site (<http://lawt.grc.nasa.gov>), and a lengthy Historic American Buildings Survey (HABS) report.



Bob Arrighi receives his award from Lin Ezell, SHFG Awards Committee member and Director of the National Museum of the Marine Corps.

OTHER NEWS IN AEROSPACE HISTORY

News from the American Astronautical Society (AAS) History Committee

Newsletter and Distribution List

Explorer, the periodic newsletter of the AAS History Committee, is available on the AAS Web site at <http://astronautical.org/committees/history/>. If you would like to directly receive each issue, as well as an occasional bit of information related to spaceflight history, send an e-mail with your request to the Chair of the History Committee, Michael Ciancone, at michael.l.ciancone@nasa.gov.

News from the National Air and Space Museum (NASM)

The National Air and Space Museum will open the exhibition *Alan Bean: Painting Apollo, First Artist On Another World* at the Museum on the Mall, 16 July 2009 through 13 January 2010, in conjunction with the 40th anniversaries of the first two Apollo Moon landings. *Alan Bean: Painting Apollo, First Artist On Another World* represents a major exhibition of paintings by American artist and Apollo 12 astronaut Alan Bean. The exhibition will be the largest exhibition of Bean's work to date with approximately 40 original paintings and drawings. The exhibit will enable viewers to experience a world 238,000 miles away through the eyes of the only artist to walk on the lunar surface. Artifacts from NASM's collection will supplement the exhibit as three-dimensional references to the lunar equipment depicted in the paintings.

A number of NASM staff participated in the 22nd annual Mutual Concerns of Air and Space Museums Conference in Ottawa, Canada, cohosted by NASM and the Canada Aviation Museum from 18 to 21 April 2009. NASM staff presented on topics including hanging artifacts in public spaces, collections planning, the care and preservation of textiles, controversy in museum exhibits, civic engagement, lab-oriented aerospace education programs, aerospace art collections, and exhibit cell phone tours. The very successful conference, which included nearly 150 participants from as far afield as Poland and Australia, concluded with extra tours of museums near Ottawa and an overnight trip to three aviation museums near Toronto.

Two NASM staff members, Roger D. Launius, Division of Space History, and Andrew K. Johnston, Center for Earth and Planetary Studies, have published the *Smithsonian Atlas of Space Exploration* (New York: HarperCollins, 2009, \$34.99, 230 pages). As the advertising copy from HarperCollins says, "The Atlas of Space Exploration depicts the ever-fascinating history of the space age and humanity's progress in exploring new frontiers. Incredible images from NASA and other sources, visual conceptions of Moon bases, and newly commissioned maps reveal a visual history spanning the earliest eras of the universe, the dawn of the space age, the launch of Sputnik, missions to the Moon, robot landings on the terrestrial planets, and the exploration of the outer solar system. These developments in technology are illuminated by a rich historical context, highlighting how space exploration has changed and expanded our vision of the universe."

Roger D. Launius received the first annual Roger R. Trask Award from the Society for History in the Federal Government (SHFG). The award is given in recognition of his commitment to federal history at NASA and the Smithsonian's National Air and

Space Museum and for his promotion of the mission of the society and his generous mentoring of colleagues. The award was given at the 2009 SHFG conference in March, and Dr. Launius delivered the Keynote Inaugural Trask Award Lecture on the mission and challenges of federal history. The Roger R. Trask Award and Fund was established by SHFG as a fitting initiative to honor the memory and distinguished career of the late SHFG president and longtime federal history pioneer and mentor, Roger R. Trask.

At the AAS's Goddard Symposium in March, in Greenbelt, Maryland, Michael Neufeld, Division of Space History, received the Eugene M. Emme Award for Astronautical Literature for his *Von Braun: Dreamer of Space, Engineer of War* (2007). This spring it appeared in Danish and German translations: *Von Braun: Krigsingeniør og rumfartsvisionær* (Copenhagen: Schönberg, 2009) and *Wernher von Braun: Visionär des Weltraums—Ingenieur des Krieges* (Munich: Siedler, 2009).

John Anderson and Von Hardesty, Aeronautics Division, edit the Cambridge University Press Centennial of Flight series. In this series, Scott W. Palmer's *Dictatorship of the Air: Aviation Culture and the Fate of Modern Russia* is now out in paperback. There is a new title as well: Michael B. Petersen, *Missiles for the Fatherland: Peenemünde, National Socialism, and the V-2 Missile*. Von Hardesty's *Epic Rivalry: The Inside Story of the Soviet and American Space Race* (with Gene Eisman; National Geographic Books, 2007) has been translated into Russian under the title *Istoriya kosmicheskogo sopernichestva SSSR i SShA* (St. Petersburg: Piter, 2009).

UPCOMING MEETINGS

The U.S. Army Center of Military History Biennial Conference, "Exiting War: Phase IV Operations" will be held **27–30 July 2009** in Washington, DC. Please visit <http://www.history.army.mil/2009cahl/index.html> for more details.

The Annual Meeting of the Society of American Archivists will be held **11–16 August 2009** in Austin, Texas, at the Austin Hilton. Please see <http://www.archivists.org/conference/index.asp> for more details.

The Annual Meeting of the Oral History Association, "Moving Beyond the Interview," will be held **14–18 October 2009** in Louisville, Kentucky. Please see <http://www.oralhistory.org/annual-meeting/> for more details.

The Annual Meeting of the Society for the History of Technology will be held **15–19 October 2009** in Pittsburgh, Pennsylvania. Please see http://www.historyoftechnology.org/annual_meeting.html#future_mtgs for more details.

The fall Meeting of the Mid-Atlantic Regional Archives Conference will be held **29–31 October 2009** in Jersey City, New Jersey. Please see <http://www.lib.umd.edu/MARAC/conferences/conferences.html> for more details.

The Annual Meeting of the History of Science Society will be held **18–22 November 2009** in Phoenix, Arizona. Please see <http://www.hssonline.org/> for more details.

The AAS History Committee will host its Annual Meeting on **19 November 2009** in conjunction with the AAS National Conference at the Pasadena Hilton in Pasadena, California. Please see <http://www.astronautical.org/events/> for more details.

OBITUARIES

Konrad Dannenberg, 96

Remembering Konrad Dannenberg

By Frederick I. Ordway III

At the invitation of Wernher von Braun, in early April 1956 I made my first trip to Redstone Arsenal in Huntsville, Alabama. There, I was briefed on the missions of the newly created Army Ballistic Missile Agency (ABMA) whose Development Operations Division von Braun directed and was introduced to some of his key associates. I don't recall if I met Dannenberg on that first trip, or the second in May, or perhaps even the third in August. But I do know by the time my family and I had moved to Huntsville full time in mid-February 1957, we were already well acquainted. That was 52 years ago.

My wife, children, and I settled into life atop Huntsville's Monte Sano and before long had developed many friendships. Among the German families living on Monte Sano whom we soon got to know were Konrad and Ingeborg Dannenberg, Fred and Ruth von Saurma, Arthur and Martha Rudolph, Rudolf and Dorette Schlidt, Ernst and Irmgard Stuhlinger, Gerhard and Gisela Reising, Eberhard and Gerlinde Rees, and Werner and Erica Rozinski. It was a wonderful community that welcomed those from far and wide who had made their home overlooking Huntsville, Alabama.

That was the environment in which I first got to know Konrad Dannenberg and learn something of his illustrious career. We also interacted in the office environment at ABMA on Redstone Arsenal, attended Huntsville chapter meetings of the American Rocket Society (later, the American Institute of Aeronautics and Astronautics) and other organizations, and occasionally at meetings of the International Astronautical Federation that were held in many parts of the world.

I later learned Dannenberg was born on 5 August 1912 in Schloss Neu Augustusburg in Weissenfels, Prussian Saxony. His father, Heinrich Hermann Dannenberg, was a *Feldwebel* or master sergeant in the regular Prussian Army. Konrad's mother was Klara Elisabeth Kittler. His younger sister, Elizabeth Sophie Hildegard, died of cancer during World War II.

As a boy, Konrad was influenced by amateur rocket experimenter Max Valier and automobile personality and rocket enthusiast Fritz von Opel. Valier's *Der Vorstoss in den Weltenraum* (*The Advance into Space*) had first appeared in 1924 and undergone five printings before being enlarged and re-titled *Raketenfahrt* (*Rocket Flight*) in 1930. Those books and a series on rocket-car and rocket-sled tests in 1928 at the Opel track near Ruesselsheim caught Dannenberg's attention. In June and again in October, rocket railcar experiments were carried out, and about the same time rockets were attached to gliders at Redstock near Frankfurt. Clearly, rocketry was in the air, and young Konrad inhaled it with gusto, promptly joining a group of amateur rocket enthusiasts guided by Albert Puellenberg.

Dannenberg enrolled in the Hannover Institute of Technology in 1931, but his studies were interrupted for a year while he trained in a motorized antitank company for the newly enlarged *Reichswehr*. A year later, he signed up for reserve

officer training, meaning he would have to spend his summers on duty while continuing his engineering studies during the academic years. He rose to the rank of master sergeant.

Having fulfilled his military requirements, Dannenberg went on to graduate from the Hannover Institute of Technology in 1938, earning a Diploma Engineer (*Dipl. Ing.*) degree in mechanical engineering having specialized in combustion engineering. He remained for a year at the institute after graduation as assistant to his combustion-engineering professor, Dr. Kurt Neumann. From there, until the outbreak of World War II, he worked as a trainee at the VDO firm (*Vereinigte Deuta-Ota*) in Frankfurt-am-Main.

As a reservist, Master Sergeant Dannenberg was soon called into active military service, reporting to duty in a horse-drawn antitank-gun unit. He was quickly promoted to lieutenant and saw action during the French campaign, on horseback! Meanwhile, his prewar VDO employer had requested his release from the Army to help convert its production lines from peacetime to wartime conditions. The request was granted, and Dannenberg returned to Frankfurt.

But only temporarily. It turned out that his prewar amateur rocket colleague, Albert Puellenberg, had been hired by Captain Walter Dornberger of the Rocket Research and Development Center at Peenemünde on Germany's Baltic Sea coast and invited Konrad to apply for a position. He did, and soon received an invitation for an interview with Dr. Walter Thiel. The interview went well, and Dannenberg ended up at Peenemünde in 1940, his training in combustion engineering about to be put to the test.

Once settled in, Dannenberg learned that under Dornberger's military organization was another erstwhile amateur rocket experimenter, the center's technical director, Dr. Wernher von Braun. His rapidly growing rocket team was engaged in an array of projects, the most notable being the A4 ballistic missile. Dannenberg was assigned to Thiel's A4 propulsion team and told to focus his talents on the rocket engine's ignition system. On the 3 October 1942, the A4 made its first successful test, reaching a range of 118 miles. Konrad would later reminisce that it was *the* most memorable flight in his career.

With the end of the war, Dannenberg and 117 other Peenemünde colleagues wound up in Fort Bliss, Texas, as part of Project Paperclip. There, under von Braun's technical direction, they continued work in the field of rocketry, passing on their knowledge to U.S. Army Ordnance and contractor personnel. Twenty years after the Max Valier/Fritz von Opel trials of the late 1920s, Dannenberg found himself in a new country launching erstwhile military rockets for peaceful purposes.

In 1950, the Fort Bliss rocket team was transferred to Redstone Arsenal just outside Huntsville in northern Alabama. There, Dannenberg applied his propulsion expertise to the Army's 200-mile-range Redstone rocket and later to the considerably larger Jupiter intermediate-range (1,600 miles) ballistic missile (IRBM). Both carried nuclear warheads.

An experimental Jupiter IRBM flight that particularly pleased Dannenberg took place on 28 May 1959 during which two monkeys were lofted 300 miles into space and recovered in the Atlantic Ocean, surviving unharmed in their protective capsule.

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Obituaries (continued)

Dannenberg was closely involved in the conversion of the Redstone into the Jupiter-C three-stage reentry test vehicle that itself would evolve into the four-stage Juno I launch vehicle. On 30 September 1956, a Jupiter-C hurled a payload 3,400 miles down range from Cape Canaveral attaining a maximum altitude of 682 miles; on 31 January 1958, a Juno I orbited Explorer 1, America's first artificial satellite. Dannenberg's thoughts must have gone back to those Max Valier and Fritz von Opel trials, marveling at the vital role he was playing 30 years later.

To coordinate America's blossoming space program, the National Aeronautics and Space Administration was created in 1958. By mid-1960, the new agency had acquired von Braun's Army Ballistic Missile Agency rocket team at Redstone Arsenal. On dedication day, 1 July 1960, the team officially became the nucleus of a brand new NASA facility, the George C. Marshall Space Flight Center, dedicated by President Dwight D. Eisenhower in the presence of Mrs. Marshall. The team's military-missile responsibilities had passed on to the hands of others. Suddenly, the path lay open to the Moon and beyond.

Konrad Dannenberg, ready for the change and eagerly plunging into the development of the Saturn series of launch vehicles, soon rose to the position of Deputy Manager. What became known as Saturn I evolved from studies of a Juno V booster that had been conducted at ABMA before its transfer to NASA. That design led to the development of the Saturn I launch vehicle, 10 of which were flown between October 1961 and July 1965 chalking up a 100 percent success record.

The larger Saturn IB followed, and, between 1966 and 1968, four were tasked to check out the unpiloted Apollo Command and Service Module (CSM), including reentry into Earth's atmosphere, and to monitor Apollo Lunar Module performance as well. Saturn IB launchers were also called upon to test the performance in Earth orbit of the piloted Apollo 7 CSM combination. During 1973 and 1974, the Saturn IBs transported three separate crews up to the *Skylab* space station; in 1975, the last one flown participated in the Apollo-Soyuz Test Project, a U.S./Soviet joint program focused on rendezvous in Earth orbit. All nine Saturn IB flights were successful.

Konrad Dannenberg's most daunting challenge was the development and launching of giant Saturn V rockets; his decades-long experience was soon to be put to the ultimate test. In 1968, 40 years after the Valier/von Opel rocket demonstrations in Germany, two Saturn Vs were flown. The first placed the uncrewed Apollo 6 into orbit around Earth where a series of tests were conducted before the Command Module successfully reentered the atmosphere. Then, on 21 December, another Saturn V sent Apollo 8 astronauts Frank Borman; James A. Lovell, Jr.; and William A. Anders along a circumlunar trajectory. Dannenberg was ecstatic and later declared it was the second most emotional flight witnessed during his career—right behind the first successful A4 flown 26 years earlier. As in the case of the Saturn I and IB rockets, all 13 Saturn V flights were successful, making a grand total of 32 launch vehicles in the Saturn series that were flown. Three fully restored Saturn Vs still exist and are on display at Kennedy Space Center, Cape Canaveral, Florida; at the U.S. Space & Rocket Center in Huntsville, Alabama; and at Johnson Space Center in Houston, Texas.

In 1973, having received NASA's Distinguished Service Medal for his work on the Saturn program, Konrad Dannenberg retired—at least from NASA. For five years,

he taught at the University of Tennessee's Space Institute in Tullahoma. During the 1980s, 1990s, and into the 21st century, he lectured tirelessly to thousands of young people on the promise and wonders of spaceflight, often to space campers at the U.S. Space & Rocket Center in Huntsville. He attended professional meetings, traveled, and wrote. At times his pace seemed without limit.

Dannenberg was a fellow of the American Institute of Aeronautics and Astronautics, president on two occasions of its local Alabama/Mississippi section, and recipient of the 1990 Durand Lectureship and of the 1995 Hermann Oberth Award. Back in the mid-1970s he had joined the L-5 Society that later merged with the National Space Institute, whose first president was Wernher von Braun, to become the National Space Society. The merger broadened Konrad Dannenberg to new audiences nationwide.

I'll describe briefly a few episodes that we shared in recent years. During much of 2003, we collaborated with Werner K. Dahm, Walter Haeussermann, Gerhard Reisig, Ernst Stuhlinger, Georg von Tiesenhausen, and Irene Willhite on a lecture entitled "A Memoir: From Peenemünde to USA: A Classic Case of Technology Transfer" that I had the honor of presenting at the 54th International Astronautical Congress in Bremen, Germany. For the next couple of years we expanded the lecture into a professional paper, under the same title, published in the International Academy of Astronautics' journal *Acta Astronautica* (60, 2007, pages 24–47).

On 29 September and 4 October 2004, Mike Melville and Brian Binnie piloted *SpaceShipOne* within a prescribed two-week period to an altitude of more than 100 kilometers. Those feats led to the winning for Scaled Composites creator-designer-builder Burt Rutan the \$10 million Ansari X Prize. Dannenberg had earlier visited Mojave to witness a test flight on 21 June 2004 and declared it to be the third most exciting flight in his long career in rocketry. Returning home, he later e-mailed Rutan that ". . . I was present when the Space Age opened about 62 years ago in Peenemünde with the first successful launch of an A4/V2. I had also observed the first two failed launches, and was aware of the big step we made at that time. It is for me still today the most impressive launch I ever saw . . . I believe your forthcoming launch of *SpaceShipOne* will be in the same category." That June test flight and the award-winning flights a few months later led to an informal Dannenberg-Rutan mutual admiration society solidified by reciprocal visits to and from Huntsville and Mojave, California.

In recognition of the triumph, on the 19 May 2005, Dannenberg and I presented Burt Rutan with the National Space Society's Wernher von Braun Memorial Award at the International Space Development Conference in Washington, DC. Following his remarks, Dannenberg handed to Rutan a scale replica of an early von Braun ferry rocket concept mounted beside a scale model of the Saturn V with engraved wording. For my part, I gave him *He Conquered Space*, a Discovery Channel biography of Wernher von Braun on which I had worked, its DVD boxed and inscribed by Discovery Founder and Chairman John S. Hendricks. Finally, I presented the awardee a boxed edition of Ernst Stuhlinger's and my two-volume biography entitled *Wernher von Braun: Crusader for Space* published by Krieger (with inscriptions by the authors and publisher). I observed the obvious pleasure Dannenberg and Rutan demonstrated; like minds bind!

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Obituaries (continued)

Then there was the 50th-anniversary celebration of the launching and orbiting of Explorer 1, America's first artificial satellite, an event especially dear to Dannenberg. In the unexpected absence of Ernst Stuhlinger due to illness, Dannenberg was the only "old-timer" on a retrospective panel that National Space Society executive director George Whitesides and I chaired on 31 January 2008 at the Von Braun Center in downtown Huntsville. Following an introduction by overall event coordinator Ralph Petroff—there were other panels—our panel got to work. Its members were Steven J. Dick, NASA Chief Historian; Roger D. Launius, Senior Curator at the National Air and Space Museum; and Dwayne Day, Space Studies Board, National Academies of Science. Our special panel guest that day was Natalya Koroleva, daughter of Sergei Korolev, von Braun's counterpart in the Soviet Union and father of the Sputnik satellite series.

That evening, we all adjourned to the brand new Davidson Center for Space Exploration at the U.S. Space & Rocket Center, where the celebration continued for hours under the horizontally mounted, fully restored Saturn V-500 D/F. No one was more wide awake than Konrad Dannenberg when, accompanied by his devoted wife Jackie, he was presented a special Explorer 1 award by Major General James R. Myles, commander of the U.S. Army Aviation and Missile Command. One often forgets that Explorer 1 was the creation of the Army Ballistic Missile Agency; the flight occurred 2½ years before von Braun's rocket team became part of NASA.

The last time I saw my friend Konrad was in Huntsville during a visit tied to a 7 February 2009 Year of Apollo gala banquet in the same Davidson Center. Knowing that Dannenberg had counted on participating, I was disheartened to learn that he was hospitalized. I visited him at his bedside in Huntsville Hospital the next morning and found him pale and weak. Learning from Jackie that he was to be released to a rehab center, I shared some optimism and was pleasantly surprised when I visited him the afternoon of the 12th, the day before my return to Washington. He seemed a different person, looking forward to rehab procedures and changing to a new room.

But it was not to be. Four days later, my friend of more than half a century departed this Earth forever.

Konrad Dannenberg is survived by his second wife of 18 years, Jacquelyn Staiger, whom he had married in Plymouth, Massachusetts, on 31 March 1990; his son Klaus; daughter-in-law Betty; and two grand- and four great-grandchildren. Dannenberg's first wife, Ingeborg, died in 1988; they had married in Zinnowitz, Germany, near Peenemünde, in early April 1944.

Acknowledgments

I am deeply appreciative to Konrad Dannenberg's wife Jackie and his son Klaus for critically reviewing the text, filling in blanks, and patiently answering questions. To them, Brenda Carr, Ray Cronise, and Ralph Petroff go my sincere thanks for helping locate photographs; in the case of the Cronise image of Dannenberg and Burt Rutan together, it is copyright 2004. To NASA chief historian Steven Dick, I express my gratitude for inviting me to remember a friend and colleague of over half a century, Konrad Dannenberg.

Memories of Konrad Dannenberg

By George S. James, Department of Energy

I first met Konrad Dannenberg in the summer of 1950 when I went to work at the North American Aerophysics Laboratory (NAA) in Downey, California. Imagine my surprise and pleasure to be working on the U.S. Air Force Navaho project with an individual from Peenemünde, who actually helped develop the V-2, one of my great interests.

Four summers earlier, I had spent many a lunch hour at the Caltech Jet Propulsion Laboratory examining the complete V-2 that was located on its side near a large oak tree. I had been fortunate to have a summer job there through the assistance of Dr. Frank Malina and Dr. Theodore von Karman.

Moreover, less than month into my JPL job, I had to request a two-week leave because, as the representative of our young Rocket Research Institute (RRI), I received an invitation from the U.S. Army to witness the launch of V-2 s/n 6 on 28 June 1946 at White Sands.

After an uninspiring bus trip from Los Angeles to Las Cruces, the most spectacular, awe-inspiring, successful V-2 flight was an event that I will never forget, particularly since the other spectators and I were “behind the fence” only 1,000 feet from the V-2 as it ignited and majestically rose, with an earhattering roar, into the clear blue New Mexico sky forming a white corkscrew vapor trail.

As Dannenberg had belonged to a student rocketry group in the late 1920s, and as I had been involved with the Rocket Research Institute since 1943, we shared a common thread of enthusiasm at NAA that summer in 1950.

Konrad Dannenberg and Dr. Walter Reidel III, both among the 117 engineers and scientists from Peenemünde who wound up at Fort Bliss, Texas, as a result of Project Paperclip, were part of the NAA team members responsible for evolving from the 56,000-pound-thrust V-2 rocket engine system a brand new design of 75,000-pound-thrust for the MX-770 Navaho missile. By the time I arrived at NAA, initial full-scale static firing tests of the new engine had been conducted at the Santa Susana facility. Subsequently, this engine became the propulsion system for the Redstone because an even higher thrust engine was required for the scaled-up Navaho.

My joy of working with “real rocket engine engineers” came to a halt when, on 22 September 1950, I was drafted into the U.S. Army for the Korean War. After basic training at Fort Ord, California, I was assigned to the Army’s Special Professional Personnel Program and, in early January 1951, reported to the Army Chemical Center in Edgewood, Maryland.

On a subsequent leave from Edgewood to my home in Glendale, California, in May 1951, I stopped by the NAA to visit with Konrad. In the course of our conversation, he mentioned that the Fort Bliss Peenemünde group had been transferred to Redstone Arsenal in Huntsville, Alabama, to work on development of the Redstone ballistic missile.

With his suggestion and the help of many others, I was extremely fortunate to report in September 1951 to the U.S. Army, 9330 Technical Service Unit, stationed at Redstone Arsenal. Here I worked with a number of Dannenberg’s colleagues, including Kurt Debus, Krafft Ehrlicke, Hans Heuter, Eberhard Rees, Rudolf Schlidt,

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Obituaries (continued)

Ernst Stuhlinger, and also Wernher von Braun on virtually a daily basis in preparing Redstone reports and other materials.

The high priority and secret classification of the Redstone program was necessary because in the first years of the Korean War complete air superiority over Korea could not be assured. Consequently, if the delivery of a nuclear weapon were to have been authorized, the Redstone was to be the absolutely MiG-proof method of doing so. We all prayed in our hearts that such a need would never be necessary.

I switched, upon being discharged from the Army on 22 September 1952, to the U.S. Civil Service (same job), until December when I received a scholarship (applied for early in 1950) to study with Frank Lloyd Wright at his School of Architecture to learn how he was uniquely applying modern technology to create residences that were in harmony with nature, now called sustainable, for families in beautiful environmental settings.

My decision to leave the Redstone team was upsetting to Dr. von Braun. “Why do you wish to leave us to study with such an old man?” Mr. Wright was then 84. Years later, when I saw von Braun here in Washington, DC, he said, “I now understand Mr. James; we will need architects on the moon.”

The next opportunity I had to visit with Mr. Dannenberg was not until years later when my wife and I attended the ceremony in Huntsville honoring those who had worked on the Redstone Missile program. By then, the Redstone had demonstrated an important peacetime use in the Mercury-Redstone launching of NASA astronaut Alan Shepard on the first U.S. piloted suborbital flight on 5 May 1961.

In October 1993, Konrad presented a paper, “Rocket Center Peenemünde; Personal Memories,” which he and Ernst Stuhlinger had prepared, at the 44th International Astronautical Congress in Graz, Austria; Graz also was the home of the famous rocket mail pioneer, Friedrich Schmiedl. I asked Karlheinz Rohrwild, the Curator of the Hermann Oberth Spaceflight Museum, in Feucht, Germany, and a member of our IAA History Group, to try to call Mr. Schmiedl and see if we could visit him. To our delight, Mr. Schmiedl said yes.

It was the realization of a dream to actually meet the gentleman whose work had so inspired me in my early years. Karlheinz and I were accompanied by Elmar Wild, an associate of his at the Oberth Museum, and Herve Moulin, President of HMI, Paris, France. Unfortunately, Konrad was not able to attend what became the first of two meetings with Mr. Schmiedl that week.

During the first visit, on 17 October, Karlheinz served as translator. It was such a pleasure to meet Mr. Schmiedl and to find that he was still so alert and active at 91. We learned much new information about his rocket mail experiments, which had achieved worldwide publicity in 1931. Karlheinz, whose museum is dedicated to the lifework of the German rocket pioneer, Hermann Oberth (1894–1989), was particularly interested in Mr. Schmiedl’s accounts of his pre-World War II meetings with Professor Oberth. Mr. Schmiedl was extremely gracious and invited us back later during the week.

For the second visit, Mr. Dannenberg was able to accompany us, along with Frank Winter of the Smithsonian National Air and Space Museum. Mr. Schmiedl, in his discussions with Konrad and our group, told us of his involvement with the founding

of the Austrian Rocket Society in 1926 that preceded the more publicized formation of the German Rocket Society in 1927, and about his engineering career. Also, we learned about the early days of rocketry in Austria prior to the takeover by Germany and the subsequent demise of Mr. Schmiedl's Austrian experimental activities. At the time of our meeting, he was Austria's oldest living rocket mail and space pioneer who had personally experienced these events.

During our long friendship, Mr. Dannenberg had mentioned that he had worked with Dr. Walter Thiel at Peenemünde. Consequently, at my request early in 2005, he graciously wrote an introductory paragraph on Dr. Thiel's contributions to the V-2 propulsion system, for the cover photo of Dr. Thiel and two associates standing in front of a V-2 in 1942 at Peenemünde, for the cover of the 1997 Proceedings of the 31st History Symposium of the International Academy of Astronautics.

The last time I had the opportunity to spend time with Konrad was 20 March 2005. My wife and I had lunch with him and his son Klaus at Reagan National Airport prior to Mr. Dannenberg's flight back to Huntsville. The previous evening he and Fred Ordway had presented to Burt Rutan, the founder of Scaled Composites, the National Space Society's Wernher von Braun Memorial Award at the International Space Development Conference in Washington, DC, for the *SpaceShipOne* team in achieving an altitude of more than 100 kilometers within the prescribed two-week Ansari X Prize period the previous year and thus winning that competition.

We talked about Mr. Rutan, who had become a good friend on Konrad's, and how his pioneering civilian achievement had given even greater emphasis to our mutual interest in student space-science-related programs such as the exemplary motivational activities in which he had involved himself through the U.S. Space & Rocket Center in Huntsville.

Over the next four years, Fred Ordway was my principal source of information on Mr. Dannenberg. Then, on 15 December 2008, I met in Washington, DC, with Ralf Heckel, Chairman of the German Space Education Institute (SEI), along with his wife, Yvonne, and their young daughter, Cosma. The SEI is one of the youth-oriented space education organizations that Mr. Dannenberg supported. They had just returned from Huntsville helping organize next year's NASA Moon-Buggy competition. The video they gave me included showing Konrad, looking as great as ever, participating in the 50th-anniversary celebration of the launching and orbiting of Explorer 1, America's first artificial satellite, at the brand new Davidson Center for Space Exploration at the U.S. Space & Rocket Center on 31 January 2008.

A little over a year later, on Monday, 16 February, when I turned on my e-mail at work, there was a note from Kerrie Dougherty, of our International Academy of Astronautics History Group, that Konrad Dannenberg had passed away. It was sad notice. Not only had I lost a good friend that I had known for 59 years, but the space community had lost a brilliant engineer and a most active advocate of space exploration and its future.

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Obituaries (continued)

Photos of Konrad Dannenberg



Dannenberg as a student at the Hannoverische Hochschule (Hannover Institute of Technology), circa 1934–35. Courtesy: Klaus Dannenberg.



Photograph taken in Germany in 1945, just before Dannenberg left for the United States with fellow von Braun rocket team members assigned to Project Paperclip. Courtesy: Klaus Dannenberg.



Dannenberg dressed for a television interview on 22 December 2008. Courtesy: Jackie Dannenberg.



Left to right, Karlheinz Rohrwild, George James, Konrad Dannenberg, Friedrich Schmiidl, and Frank Winter are standing in the doorway of Mr. Schmiidl's house in Graz, Austria, October 1993. The model rocket, in front of Mr. Dannenberg, was received by Mr. Schmiidl from a group of Austrian space enthusiasts. Photo Credit: Elmar Wild/RRI Archives.

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Obituaries (continued)



Major General James R. Myles, commanding general of the U.S. Army Aviation and Missile Command, Redstone Arsenal, Alabama, presents Konrad Dannenberg the Explorer 1 Award on the 50th-anniversary gala celebration of the satellite's reaching orbit on 31 January 1958. The ceremony took place at the Davidson Center for Space Exploration, part of the U.S. Space & Rocket Center on 31 January 2008. Courtesy: Emmett Given, Marshall Space Flight Center.



Photograph of Dannenberg used for publicity purposes during the 1959–60 period when the Wernher von Braun rocket team transferred from the Army Ballistic Missile Agency to the new George C. Marshall Space Flight Center. Courtesy: Klaus Dannenberg.



“America in Space January 31, 1958 50th Anniversary” was the title of the U.S. Space & Rocket Center-Huntsville/Madison County Chamber of Commerce celebration of the 50th anniversary of the orbiting of Explorer 1 50 years earlier. Here, at the Remembering Explorer 1 Panel at the Von Braun Center in Huntsville, a model of Explorer 1 is held up by, left to right, panel chairman Frederick I. Ordway III, panel member Konrad Dannenberg, and panel cochairman George Whitesides. At the far left at the podium is Ralph Petroff, overall symposium organizer, and next to the full-scale model of Sputnik I stands Natalya Koroleva, the daughter of the satellite’s designer, Sergei Korolev. Courtesy: Ralph Petroff.



This photograph was taken at the October 2004 Alabama Information Technology Association annual meeting in Birmingham. The highlight of the occasion was Dannenberg’s accepting the first Genesis Award for Lifetime Achievement on behalf of Wernher von Braun and members of his rocket team. His 5-minute thank-you oration deeply impressed the audience. At the same gathering, Dannenberg’s astronaut friend and colleague Walter “Wally” M. Schirra, Jr., gave a stirring lecture. Courtesy: Jackie Dannenberg.

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Obituaries (continued)



Konrad Dannenberg chatting with Burt Rutan at the Voyager restaurant in Mojave, California, on 22 June 2004, the day after the successful test flight of Rutan's *SpaceShipOne*. Copyright 2004 by Raymond Cronise.



On 4 October 2007, the 50th anniversary of the orbiting of Sputnik I by the Soviet Union, a group of space veterans gathered to celebrate the occasion at the Davidson Center for Space Exploration, part of the U.S. Space & Rocket Center, in Huntsville, Alabama. Here they stand, under the shadow of the recently restored Saturn V-500 D/F with a full-scale Sputnik I model in the foreground. The group reasoned that if it were not for that Sputnik, there might not have been a space race, and the U.S. might not have developed the Saturn V to power astronauts to the Moon between 1968 and 1972. From left to right: Konrad Dannenberg, Homer Hickam, William Lucas, Ernst Stuhlinger, and Julian Davidson. Courtesy: Al Whitaker, U.S. Space & Rocket Center.

Eilene Galloway, 102

By Rebecca Wright, history coordinator, Johnson Space Center

Since the dawn of the Space Age, Eilene Galloway helped to ensure peace in outer space. For more than 50 years, her wisdom influenced policies and treaties to enable an international cooperation for space exploration. She authored more than 100 works reflecting her knowledge of space law, technology, broadcast satellites, telecommunications, national security, and international relations.

Two days before her 103rd birthday, Eilene Galloway passed away at her home in Washington, DC.

During her lifetime, she shared her expertise on topics ranging from Sputnik to the International Space Station, and most recently, she addressed the issues of space law relating to the nation's quest of returning to the Moon and then traveling on to Mars. Evident throughout this extensive collection of publications, lectures, policies, and papers is her belief that only peaceful and beneficial uses of outer space should prevail.

Galloway began her illustrious career at a time when there was no space policy. She started working in 1941 with the Congressional Research Service of the Library of Congress, then known as the Legislative Reference Service, as a National Defense Analyst and later as a Senior Specialist in National Security. Her numerous House and Senate documents received a great deal of attention from the legislators, especially her report on "Guided Missiles in Foreign Countries."

Her career took a definite turn on Friday, 4 October 1957, when the Soviet Union captured the world's attention by launching Sputnik. Early on the following Monday morning, she answered a phone call from Senator Lyndon B. Johnson. Immediately, she became a special consultant to him and Congressman John W. McCormack for the congressional hearings that set the foundation for the nation's entry into the space race.

As part of these efforts, Galloway assisted in writing the legislation passed by Congress on 29 July 1958 to establish the National Aeronautics and Space Administration (NASA). She contributed particularly to the provisions for international space cooperation. She continued working closely with Johnson—then the U.S. Senate Majority Leader—as he prepared to represent the United States at the United Nations Assembly in November 1958. His message urged the international membership to create an ad hoc Committee on the Peaceful Uses of Outer Space (COPUOS). While attending this historic session with him, Galloway witnessed the creation of COPUOS that within a year would become a United Nations (U.N.) permanent committee.

Galloway returned to Washington, DC, after the U.N. meeting and wrote a 593-page document on space law for the Senate that was published on 31 December 1958. Subsequently, she served as a representative from the U.S. in the drafting of U.N. treaties including the Outer Space Treaty. Ratified by 98 nations, since 1967, this treaty has served as the foundation to govern the exploration and utilization of outer space and sparked the field of international space law.

For five decades, agencies and organizations throughout the world sought guidance from Eilene Galloway, who believed her main qualification was that she was not afraid of any assignment. Her words impacted a prestigious collection of decision-makers.

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Obituaries (continued)

She advised the U.S. Senate Committee on Aeronautical and Space Sciences for almost 20 years. She worked with the U.S. Department of State and its U.N. delegation regarding utilization of satellites, remote sensing, and space law. She served on numerous NASA advisory committees, as recently as 2003, and assisted the Federal Communications Commission. She consulted on the scientific aspects of space technology and policy with the United Nations; the National Academy of Sciences; the National Academy of Engineering; the United States Civil Service Commission; the U.S. House Committee on Science and Technology, Office of Technology Assessment; and the U.S. Senate Committee on Commerce, Science, and Transportation.

Galloway participated in professional societies and numerous symposia and chaired panels sponsored by prominent institutions and organizations. These include the European Space Agency, the United Nations University, the Center for Peace Studies, the Institute of Air and Space Law, Purdue University, George Washington Law School, the International Studies Association, the Federal Bar Association, the John Basset Moore Society of International Law, and McGill University in Montreal, Canada.

She held positions of leadership in the Association of U.S. Members of the International Institute of Space Law, the International Astronautical Federation Committee for Liaison with the United Nations, the International Academy of Astronautics, and the United States Group of the Interparliamentary Union.

She served as the vice president of the International Institute of Space Law of the International Astronautical Federation from 1967 to 1979, when she was elected honorary director. In 1958, Galloway was among those creating this institute that serves as a forum for scholars and others to debate legal issues on the aspects of space exploration and utilization. Annually, this group meets for its colloquium and conducts the Manfred Lachs Space Law Moot Court Competition. Members of the International Court of Justice, The Hague, decide the winners, who receive the Eilene M. Galloway Award for the Best Brief.

This pioneer of the Space Age was born on 4 May 1906 as Eilene Marie Slack in Kansas City, Missouri. After graduating from Westport High School, she was awarded a four-year scholarship to Washington University in St. Louis. There in 1923, she met her future husband, George Barnes Galloway. The next year, he completed his master's degree in political science, and they married and moved to Washington, DC. Soon after, they moved to Pennsylvania, where Galloway completed her college education with high honors at Swarthmore College in 1928. She taught political science the next two years at Swarthmore before they returned to Washington, where she was a resident for more than 75 years.

Galloway began her career in public service as the nation was beginning its recovery from the Great Depression. From 1934 to 1935, she worked for the Federal Emergency Relief Administration Division of Adult Education. Following this effort, Galloway served as a volunteer board member for the Family Service Association and also concentrated on promoting adult education in DC. She compiled a directory with all classes available to residents, including music, law, history, economics, performing arts, and mathematics. Galloway had a committee, office space, and assistance from the DC Adult Education Office, but she needed a way to distribute the directory. She personally requested help from Eugene Meyer, owner of the *Washington Post*, who

refused, so she solicited 125,000 requests for the information. With this immense interest, the *Post* reversed its decision and published the information, as well as a second printing of similar size.

She worked for the Library of Congress for 34 years as an expert in national defense, international relations, space, and astronautics until her retirement in 1975. She then shared her expertise for the next 30 years, traveling throughout the world as an independent consultant in international space activities and resolving problems concerned with the impact of science and technology on society.

Until 2004, Galloway served as an active participant in the creation of international space policy and space law. At the age of 98, she gave the keynote address at the international/national meeting of the American Institute of Aeronautics and Astronautics (AIAA), and the year before, she spoke at the International Air and Space Symposium. In March 2009, she published an article in *Space News* titled "Space Law for a Moon-Mars Program."

Many honors were awarded to Galloway, including recognition by the U.S. House of Representatives, on her 100th birthday. Calling her a distinguished American, Congress commended Galloway for her tireless work as an active participant in space policy and space law debates for almost a half century, while serving as a valuable resource to researchers and the media on historical and current space policy issues and mentoring new members of the communities associated with space exploration and utilization.

Also on the centennial of her birthday, the American Astronautical Society presented her its President's Award to recognize her distinguished career and her profound contributions to the exploration and development of space. The Institute and Center of Air and Space Law and McGill University saluted her outstanding merits by dedicating the 2006 issue of the *Annals of Air and Space Law* in her honor.

Accolades for her outstanding works include the Public Service Award and Medal from the American Institute of Aeronautics and Astronautics for her "instrumental role in formulating space legislation and guiding its implementation." Other tributes include the National Aeronautic Association's Katharine Wright Memorial Trophy, which honors a woman who has made a personal contribution to the advancement of aviation over an extended time. Galloway received the honor for "her influential role in the US space program since its inception and for developing international standards for activities in space through the UN and other organizations, and for outstanding contributions over forty-five years advising Congress on the legal and policy aspects of outer space serving the United Nations on the Peaceful Uses of Outer Space and developing international space law."

The International Astronautical Federation, International Institute of Space Law, awarded her with the Andrew G. Haley Gold Medal for Space Law for her work as an "author, lecturer, editor and commentator in connection with the creation and development of space law in order to establish and maintain the rule of law in relation to mankind's activities in Outer Space." Galloway's "lifetime of contributions to study the legal, social and scientific aspects of astronautics and the advancement of the peaceful uses of outer space" earned her the Theodore von Karman Award from the International Academy of Astronautics. Women in Aerospace honored her with its Lifetime Achievement Award and called her a "national treasure who has pioneered the understanding of the complexities of domestic and international

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Obituaries (continued)

space policy.” NASA presented her a Public Service Award and Gold Medal and Lifetime Achievement Award, as well as an American flag that flew on the Space Shuttle *Endeavour* on the first element launch of the International Space Station in December 1999.

The Cologne University Institute of Air and Space Law and German Aerospace Center Award was presented to Galloway, and she received the American Astronautical Society’s John F. Kennedy Astronautics Award for “outstanding contributions for over more than 40 years of outer space service to the United Nations Committee on the Peaceful Uses of Outer Space and the development of space law.” In 1995, she was one of a select group of experts invited to the United Nations to speak during the celebration of its 50th anniversary; she spoke on “The Role of the United Nations in Outer Space: Organization and Management.”

In May 2005, she was selected as honorary fellow by the AIAA for serving as “advisor to Congress and NASA and for legendary work in helping to create NASA, fostering international cooperation and championing the peaceful uses of outer space.” Additional honors and affiliations include honorary doctor of laws degrees from her alma mater, Swarthmore College, and from Lake Forest College; honorary membership in the Lunar Society of International Law; honorary director of the International Institute of Space Law; member of the *Journal of Space Law* editorial advisory board, University of Mississippi Law School; Trustee Emeritus of the International Academy of Astronautics; and former president of the Theodore von Karman Memorial Foundation, Inc.

She has been included in the Who’s Who in America, Who’s Who of American Women, Who’s Who in Science and Engineering, and Who’s Who in the World, whose individuals have “demonstrated outstanding achievement in their own fields of endeavor and who have, thereby, contributed significantly to the betterment of contemporary society.” She was also a member of Phi Beta Kappa and Kappa Alpha Theta; a former Swarthmore College Alumni Council member; and longtime member of St. Albans’ Episcopal Church, Washington, DC.

Galloway’s family members include her son, Dr. Jonathan F. Galloway, former professor emeritus of international relations at Lake Forest College; six grandchildren: Pamela Eilene Galloway, Dr. Gillian Q. Galloway, Christopher B. Galloway, Matthew W. Galloway, Jennifer Margaret Decker, and Annie Collier Galloway; and five great-grandchildren: Trevor B. Galloway, Carrah R. Galloway, Galen Galloway, Gabriel David Galloway, and Maitri Eilene Galloway Melichar. She was preceded in death by her husband, Dr. George Barnes Galloway, the foremost expert on the U.S. Congress, and their son, David Barnes Galloway, who served as editor of the *Los Angeles Times*, Costa Mesa, California.

Photos of Eilene Galloway



Eilene Galloway in her home.



NASA Chief Archivist Jane Odom (left), Eilene Galloway, and Johnson Space Center History Coordinator Rebecca Wright.



Eilene Galloway and NASA Chief Historian Steven Dick.



AN EVENING WITH DR. ABDUL KALAM

By Ashok Maharaj, Ph.D. candidate in history, Georgia Institute of Technology

It was on an icy cold evening in early February 2009 that I had an appointment with Dr. Abdul Kalam, the 11th president of independent India and a key player in the development of the Indian space and missile program. “Vanakkam [‘greetings’ in the Tamil language],” I said as I entered his New Delhi office. Kalam, an accomplished scientist and what historians of technology like to call a “heterogeneous engineer,” achieved iconic status in his native country after leading the development of guided missiles and the indigenous satellite launch vehicle (SLV) project. In April 2009, he became the first Asian to receive the Hoover Medal, given annually since 1930 by the American Society of Mechanical Engineers (ASME). In a land of more than a billion people, I considered myself extremely fortunate to be spending an evening interviewing Dr. Kalam about NASA’s cooperation with India over the last 50 years.

NASA’s cooperation with India began in the early 1960s with tracking stations and esoteric space sciences. Cognizant of the contributions made by Indian scientists in the fields of astronomy and meteorology, a tradition that stretches over several decades, NASA officials outlined a cooperative program focused on mutual exploration of the tropical space for scientific data. The cooperation began with the loaning of sounding rockets and launchers and with the training of Indian scientists and engineers at select NASA facilities. Kalam was one of those handpicked by Vikram Sarabhai, the father of India’s space program, for NASA training. Later, in the mid-1970s, NASA and India collaborated on an experimental project called Satellite Instructional Television Experiment (SITE). Touted as a massive experiment in social engineering, the project was hailed by some, including British science fiction writer Arthur C. Clarke, as the greatest communications experiment in history. However, NASA’s relationship with India was not uniform but ebbed and flowed according to the shifting geopolitical realities of the Cold War. More recently, this relationship has stabilized, allowing for

new successes, such as Chandrayaan I, an Indian-led scientific data collection mission that carried two NASA-built instruments on its maiden voyage to the Moon. It was a proud moment for NASA to see the maturation of a space program that it helped to found with the Indian scientific elite in the early 1960s.

Dr. Kalam's training in the early 1960s spanned three NASA facilities: Langley Research Center (LaRC) in Hampton, Virginia; Goddard Space Flight Center (GSFC) in Greenbelt, Maryland; and Wallops Flight Facility at Wallops Island, located on Virginia's Eastern Shore. In his autobiography, *Wings of Fire*, Kalam recalls seeing a painting, prominently displayed in the Wallops reception room, depicting Tipu Sultan's army fighting the British. "The painting depicted a fact forgotten in Tipu's own country but commemorated here on the other side of the planet. I was happy to see an Indian glorified by NASA as a hero of warfare rocketry."¹ Kalam could never have imagined at that time that he would later become the next "Tipu" of India to build guided missiles. His NASA training made possible the first sounding rocket launch on 21 November 1963 from the Thumba Equatorial Rocket Launch Station (TERLS) in southern India. Soon after the launch, Kalam noted, "Many individuals with myopic vision questioned the relevance of space activities in a newly independent nation which was finding it difficult to feed its population. But neither Prime Minister Nehru nor Professor Sarabhai had any ambiguity of purpose: if Indians were to play a meaningful role in the community of nations, they must be second to none in the application of advanced technologies to their real-life problems."²

It was close to 10 p.m. when I finished my interview with Dr. Kalam. "Nandri [Thanks]," I said before departing, and he whispered to come again.

LUNAR ORBITER IMAGE RESCUE AND THE NASA HEADQUARTERS HISTORY OFFICE

By Philip Horzempa, Historian, LeMoyne College

The recent visit to the Lunar Orbiter Image Recovery Project (LOIRP) operations area at Ames Research Center completes a circle for the History Office personnel from NASA Headquarters. The image rescue operation was begun thanks to the work of that very staff.

In late 2004, I was conducting research at the NASA Headquarters History Division, reviewing files. To my amazement, I came across a copy of a proposal to rescue and digitize the lunar orbiter image tapes! As the old adage states, "Chance favors the prepared mind." In this case, I knew how important the document was. However, I never would have had the chance without the efforts of the team at the History Office. Through the years, they have been diligent in their efforts to preserve many of the original memos, proposals, reports, articles, and photos from myriad NASA missions.

1. Tipu Sultan was killed in 1799 in the Battle of Burukhanahally, a battle in which the British captured more than 700 Indian rockets and 900 rocket subsystems. These rockets were taken to England by William Congreve and were subjected by the British to what we today call reverse engineering. See A. P. J. Abdul Kalam and Arun Tiwari, *Wings of Fire: An Autobiography* (Hyderabad: Universities Press, 1999), p. 38.

2. *Ibid.*, p. 43.

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Lunar Orbiter Image Rescue and the NASA Headquarters History Office (continued)

In this case, the History Division produced a new NASA project, the LOIRP.

The proposal I happened upon was authored by an engineer named Mark Nelson. He and his partner, Nancy Evans, had endeavored to preserve not only the tapes of the lunar orbiters' downlink, but also a collection of old equipment (tape players, tape heads) that were critical to extracting the information from those tapes. Without the Ampex FR-900 equipment, the lunar orbiter tapes would be unreadable and useless.

It took me some time to track down Mark Nelson, as his proposal was about 10 years old. When I eventually made contact with him, we decided to make another go at procuring funding for the project. That task took another couple of years, but succeeded as the result of another chance event. Comments I had posted on an Internet chat room about the lunar orbiter tapes caught the attention of Dennis Wingo, a seasoned space entrepreneur. Dennis and I made contact and made plans for him to meet Mark Nelson and Nancy Evans. Pete Worden, the Director of ARC, also helped immensely when he provided a space where the old tapes could be transferred from JPL, and the tape equipment moved from the care of Nelson and Evans. This "Operations Center" is an old McDonald's restaurant located next to ARC. A key benefit of working at the site is the air conditioning is still operational. In addition, it is a stone's throw away from the new Lunar Science Institute at ARC.

Dennis Wingo has been able to secure funding for the LOIRP, and he is now leading the effort at the "McMoon" site to refurbish the old tape equipment and read the old lunar orbiter tapes. There are 2,000 "landscape quality" photos stored on those tapes. They cover the entire surface of the Moon in exquisite detail.

There are many threads of history wrapped up in this saga. Through the preservation of the record of the lunar orbiter program, the NASA History Office has enabled an effort to restore the historic photographs from those missions. The images produced by the five lunar orbiter spacecraft mapped the entire Moon for the first time during the years 1966–67. These images were used to produce the first global map of another world. This also meant that the far side of the Moon was revealed, in detail, for the first time (earlier Soviet missions had produced only low-resolution, often fuzzy, views of the far side). All of these accomplishments were major achievements in exploration.

Now, with the genesis of the LOIRP, NASA is able to rejuvenate those images. By reading data from the original downlink tapes, the LOIRP team has demonstrated the ability to improve the resolution of the photos by a factor of two or three. This achievement is truly amazing and will enable new science to be extracted from these images obtained four decades ago. The project will directly contribute to NASA's Constellation Program of landing men and women on the Moon. By comparing detailed images of the Moon taken 42–43 years ago with new images taken by the Lunar Reconnaissance Orbiter, to be launched in June 2009, NASA will be able to calculate the rate of formation of new craters on the Moon. This information can then be used to determine the level of hazard from meteorites astronauts will face on the lunar surface. Therefore, in some ways, the LOIRP is a "new" mission to the Moon.

In addition to science, the effort to rejuvenate these images also performs a more sublime task, the preservation of history. In addition to producing humanity's first global map of its neighboring world, the lunar orbiters also recorded the first images

of Earth as viewed from the vicinity of the Moon (one example is shown in the previous edition of this newsletter). The images need to be preserved in all of their glory for the sake of future generations.

The NASA History Division can be justifiably proud of its contribution to this effort. It is no exaggeration to state that its role was absolutely critical to today's rescue of the lunar orbiter images. By preserving history, the members of that office have enabled new history to be made.

APOLLO 40TH-ANNIVERSARY EVENTS

The KSC Visitors Center will host Apollo 11 40th-anniversary activities on **16 July 2009**.

NASA Headquarters will host an Apollo 40th Anniversary History Symposium on **16 July 2009**, which will be featured on NASA TV. Please see <http://www.nasa.gov/multimedia/nasatv/index.html> for schedule and streaming video.

The Annual John H. Glenn Memorial Lecture at the National Air and Space Museum in Washington, DC, will feature the Apollo 11 crew and former NASA flight director Chris Kraft on **19 July 2009**. Please see <http://www.nasm.si.edu/events/eventDetail.cfm?eventID=1378> for details.

The Newseum will have an afternoon event featuring the Apollo 11 crew on **20 July 2009**.

The National Air and Space Museum will host an evening reception for the Apollo 11 crew and other Apollo astronauts on **20 July 2009**.

The NASA Field Centers will host First Footprints Celebrations to commemorate the Apollo 11 landing on the Moon on **20 July 2009**.

The U.S. Space & Rocket Center in Huntsville, Alabama, will host a First Footprints Celebration to commemorate the Apollo 11 landing on the Moon on **20 July 2009**.

The Apollo 11 crew will be presented with the Congressional Gold Medal in Washington, DC, on **21 July 2009**.

The Second Annual Von Braun Memorial Symposium from **21 to 22 October 2009** in Huntsville, Alabama, will feature an Apollo 40th-anniversary theme. Please see <http://astronautical.org/events/> for more details.

The Virginia Air and Space Museum will host an event commemorating the Apollo 12 40th anniversary on **14 November 2009**.

Online Resources

<http://www.nasa.gov/apollo40th>

This official NASA site commemorates the 40th anniversary of the Apollo program with a comprehensive collection of images, audio, source documents, and interactive media. As new material will continue to be added through 2012 to correspond to each mission's anniversary, this site is a valuable resource for primary materials and reflective pieces on the program's significance.

NASA HISTORY PROGRAM REVIEW

By Glenn Bugos, Historian, Ames Research Center

The Ames Research Center (ARC) hosted the 2009 NASA History Program Review from 28 to 30 April. Thirty-five people, from the NASA Centers and Headquarters, as well as history aficionados from ARC and the Bay Area, gathered to discuss their progress over the past year and review what is state-of-the-art in NASA history programs. Yvonne Pendelton, Deputy Associate Center Director, welcomed the group to ARC, highlighting how the history of the Center is a vital part of its current institutional culture. She concluded by saying she hoped every Center had a Jack Boyd, someone who can lend a historical perspective to any discussion on Center goals. Jack then delighted us with his unique perspective on the history of the Center, filled with photographs and anecdotes about his long career.

Steve Dick reviewed the work of his office, organized according to how it satisfied NASA's strategic plan goals for history. He seemed especially proud of the success of his societal impact studies and his flagship series of books: the Chertok memoirs, the *Exploring the Unknown* compendiums, and the historical data books. The activities surrounding the 50th anniversary of NASA made for an especially busy year. Jane Odom reviewed their efforts in archives, which included a flurry of activity in acquisitions, processing, and research support. Steve Garber reviewed the status of the many books in progress, 46 in total. Historians and archivists from each of the Centers then gave an update of their progress over the past year, which reflected both the diversity of the issues they confront and their common concerns.

Wednesday morning was devoted to presentations about images and audio archives. Jon Hornstein introduced us to *NASAIMages.org*, an effort of the Internet Archives to eventually present every NASA image. Megan Prelinger gave a visually stunning presentation of her book-in-progress on aerospace advertising imagery in the 1950s. April Gage reviewed her progress in curating the art program at ARC, and Sandra Johnson at Johnson Space Center gave a compelling overview of the challenges of preserving audio history. Walter Vincenti, who in 1940 was the fourth engineer hired at ARC and who eventually became an eminent professor and historian of technology at Stanford, presented a biography of William Durand and his role in making American engineering more mathematically driven.

Through various tours, ARC employees welcomed the group to see history being made. Within walking distance of the meeting rooms, we took tours of the ARC Aerospace Encounter, the Moffett Field Museum, and the Small Sats test facility (N45). On Wednesday afternoon, we loaded a bus for more extensive touring: the Aerospace Automation Laboratory, the Lunar Orbiter Image Recovery Project, the Arc Jet facility, the hyperwall of the NASA Advanced Supercomputing Facility, the 80-by-120-foot test section of the National Full Scale Aerodynamics Facility, and the Vertical Motion Simulator. The group dinner on Wednesday night featured toasts to Steven Dick, who announced that he would be retiring soon after the celebration of the 40th anniversary celebrations for Apollo 11.

Thursday morning was devoted to special topics. Douglas Vakoch of the Search for Extraterrestrial Intelligence (SETI) Institute spoke on historical analogues for SETI and astrobiology, Ken Souza of ARC presented a fascinating history of gravitational

biology, and Carl Pilcher spoke on the history of the NASA Astrobiology Institute. Tiffany Montague of Google spoke on their various space initiatives, including a demonstration of the newest release of Google Earth. Michael Meltzer gave an overview of his work on the history of the Cassini project. For those with the energy to explore even more, on Thursday afternoon we were treated to tours of historic Hangar One, of the Computer History Museum, and of the Hoover Institution Archives at Stanford University.

The 2010 meeting is tentatively scheduled to convene at Kennedy Space Center.

2009 NASA HISTORY AWARD GOES TO ERIK M. CONWAY

For his pathbreaking work on space history, ranging from aeronautics to Earth and space science, JPL historian Erik Conway was awarded the 2009 NASA Headquarters History Award. Chief Historian Steven Dick presented the award to Erik on 28 April at NASA's Annual History Review, held this year at Ames Research Center. Before coming to JPL, Erik worked as a contract historian at Langley Research Center. Although Erik has published many articles in scholarly journals, he is perhaps best known for his two most recent books. *High-Speed Dreams: NASA and the Technopolitics of Supersonic Transportation, 1945–1999* (2005) is a sophisticated study of politics, economics, and nationalism in the context of a complex technological enterprise, while *Atmospheric Science at NASA: A History* (2008) is a revealing account of NASA's sometimes contentious role in understanding Earth's atmosphere, in part through studying planetary atmospheres and Earth itself from space. Both books appeared in the New Series in NASA History, published by Johns Hopkins University Press. Erik's current research centers on robotic Mars exploration; he is analyzing the changing policies on project management and planetary science. Throughout these publications and his research career, Erik has focused on the historical interaction between national politics, scientific research, and technological change.

In addition to research and writing, as JPL historian, Erik's duties include conducting oral histories and contributing to the Lab's historical collections. His work is a credit to the strong history program that NASA has maintained now for 50 years. Congratulations, Erik!



Presentation of award to Erik Conway (left) by Steve Dick.

PHOTOS FROM THE NASA HISTORY PROGRAM REVIEW, HELD AT NASA AMES, 28–30 APRIL 2009



“Hyperwall” at Ames Research Center’s supercomputing facility.



NASA and contractor historians and archivists at the Program Review. Front row (left to right): Peter Merlin, Steven Dick, John Hargenrader, Colin Fries, Jane Odom, and Douglas Mudgway. Second row (left to right): Christian Gelzer, Erik Blackburn, April Gage, Elaine Liston, Rebecca Wright, and Anne Power. Third row (left to right): Glenn Bugos, Tracy McMahan-Mayhan, Robert Arrighi, Jennifer Ross-Nazzal, Erik Conway, Sandra Johnson, Courtney Thomas, Steve Garber, and Gail Langevin.



Exhibit in Hangar One on the history of dirigibles at NASA Ames.

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Photos from the NASA History Program Review, Held at NASA Ames, 28–30 April 2009 (continued)



NASA Chief Archivist Jane Odom and NASA Chief Historian Steve Dick in Hangar One at ARC.



Kennedy Space Center archivist Elaine Liston (left) and Marshall Space Flight Center history point of contact Tracy McMahan-Mayhan in Hangar One at ARC.



NASA Headquarters archivist Colin Fries (left) and historian Stephen Garber in Hangar One at ARC.



NASA Chief Archivist Jane Odom (left) with Glenn Research Center archivist Robert Arrighi and GRC history officer Anne Power in Hangar One at ARC.



Kennedy Space Center archivist Elaine Liston and NASA Chief Historian Steven Dick in Hangar One at ARC.



Jack Boyd (right) introducing Walter Vincenti, both of whom spoke about the history of ARC at the Program Review.

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Photos from the NASA History Program Review, Held at NASA Ames, 28–30 April 2009 (continued)



Bell Tower near Stanford University's Hoover Institute.



NASA Chief Historian Steven Dick (left), NASA Chief Archivist Jane Odom, Kennedy Space Center archivist Elaine Liston, and author Douglas Mudgway prepare to go on a tour of ARC.

Boris Chertok's Rockets and People (continued)

Korolev, particularly his last days, gives westerners an unprecedented perspective into the life of one of the most important scientific managers in the 20th century.

Although Korolev is squarely central in Chertok's narrative, the author offers a much more nuanced perspective of the Soviet space program, one that includes a panoply of other characters, from top Communist Party officials who managed the projects to junior engineers who produced many of the technical innovations. One marvels at his memory—Chertok is able to remember a vast assortment of names of people present at important managerial meetings. Much of this detail is derived from notes made in his contemporaneous diaries from the 1960s and 1970s (the originals of which have since been donated for storage to the archives of the National Air and Space Museum in Washington, DC). The chapters in volume 3 also highlight his ability to bring to life previously unknown or lesser known individuals in the history of the Soviet space program. For example, in chapter 15, on the development of the first Soviet communications satellite, Molniya-1, we find touching profiles of brilliant engineers such as 27-year-old Vyacheslav Dudnikov, the principal personage behind the design of the satellite, and Murad Kaplanov, the descendent of a royal family of Kumyks, an ethnic minority in the Soviet republic of Dagestan, who designed Molniya's payload. Other, more powerful luminaries in the Soviet space program, such as the gifted but irascible Vasilii Mishin, who succeeded Sergey Korolev in 1966, are humanized in a manner that contrasts starkly with the wooden depictions of Soviet space personalities so common in western narratives.

Chertok does not shy away from his obviously high evaluation of scientists and engineers. Like many of his generation, i.e., those that came of age in the 1930s and went on to leading industrial and government positions after World War II, his faith in the power of science and technology to solve the world's problems remains undiminished. In this technocratic view of the ideal human society, Chertok sees a prominent and positive role for scientists and engineers in the functioning of an advanced society. The problems with science and technology are not with those who produce them but rather those—especially politicians and bureaucrats—who *use* them. It's not surprising that Chertok's account of Minister of Defense Rodion Malinovskiy's visit to Baykonur is scathing; he recalls how the minister had little interest in learning anything about the technology at the launch site, waving away a colonel's report by saying, "I don't need you to tell me what's what. You already take me for a complete fool. Instead, why don't you tell me where the latrine is around here" (chapter 12, p. 353).

The richness of Chertok's writing should not obscure the fact that this is a memoir written by a historical participant, not a tome authored by a professional historian. In other words, the opinions presented here are by definition subjective and thus prone to the same kinds of limitations inherent in any recollection, especially one made over four decades after the events. Partly as a corrective to his own fallibilities, Chertok does an excellent job of using supporting evidence to buttress his impressions. For example, he makes liberal use of recently published material in the Russian press, such as primary documents published in various books or groundbreaking articles by Russian journalists who have uncovered previously unknown aspects of the Soviet space program. Similarly, since the publication of the first edition in the 1990s, a number of direct participants of space-related events have offered Chertok their own impressions, which he has generously reproduced at various points in the narrative. A recent landmark collection of original government

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Boris Chertok's Rockets and People (continued)

documents on the early history of the Soviet space program appeared too late for Chertok to use in these memoirs, but future historians will find it useful to juxtapose Chertok's accounts with the evidence from these primary documents.³

It has been my great fortune to meet with Academician Chertok several times since this project got off the ground. Chertok, who is now a sprightly 97 years old, continues to speak passionately and emphatically about his life's work and remains justifiably proud of the achievements of the Russian space program. After our last meeting, I was reminded of something that Chertok had said in one of his very first public interviews in 1987. In describing the contradictions of Sergey Korolev's personality, Chertok had noted: "This realist, this calculating, [and] farsighted individual was, in his soul, an incorrigible romantic."⁴ Such a description would also be an apt encapsulation of the contradictions of the entire Soviet drive to explore space, one which was characterized by equal amounts of hard-headed realism and romantic idealism. Academician Boris Yevseyevich Chertok has communicated that idea very capably in his memoirs, and it is my hope that we have managed to do justice to his own vision by bringing that story to an English-speaking audience.

3. Yu. M. Baturin, ed., *Sovetskaya kosmicheskaya initsiativa i gosudarstvennykh dokumentakh, 1946–1964 gg.* [*Soviet Space Initiatives in State Documents, 1946–1964*] (Moscow: RTSoft, 2008).

4. Konovalov, "Ryvok k zvezdam."

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We also welcome comments about the content and format of this newsletter. Please send comments to Steve Garber, newsletter editor, at stephen.j.garber@nasa.gov.

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